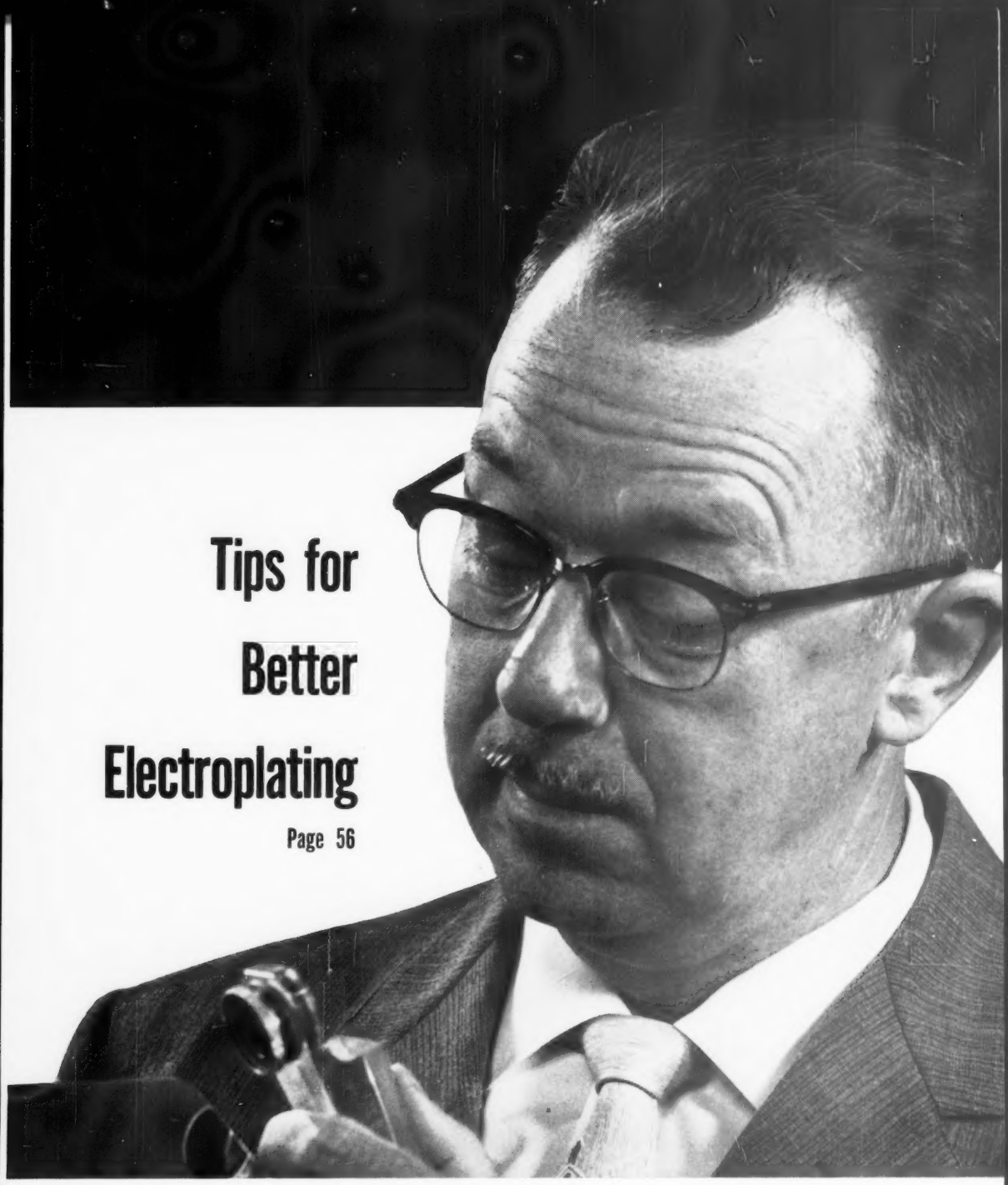
STEEL
The Metalworking Weekly
A PENTON PUBLICATION
JULY 31, 1961

Tips for Better Electroplating

Page 56



Battelle's C. L. Faust and teammates talk to both platers and users

How to Trim Your Shipping Costs 28

PROGRAM FOR MANAGEMENT

Design for Profit Growth 35

Punched Tape Proves Out on Grinder . . 60

Building Panels Take on New Luster . . . 90

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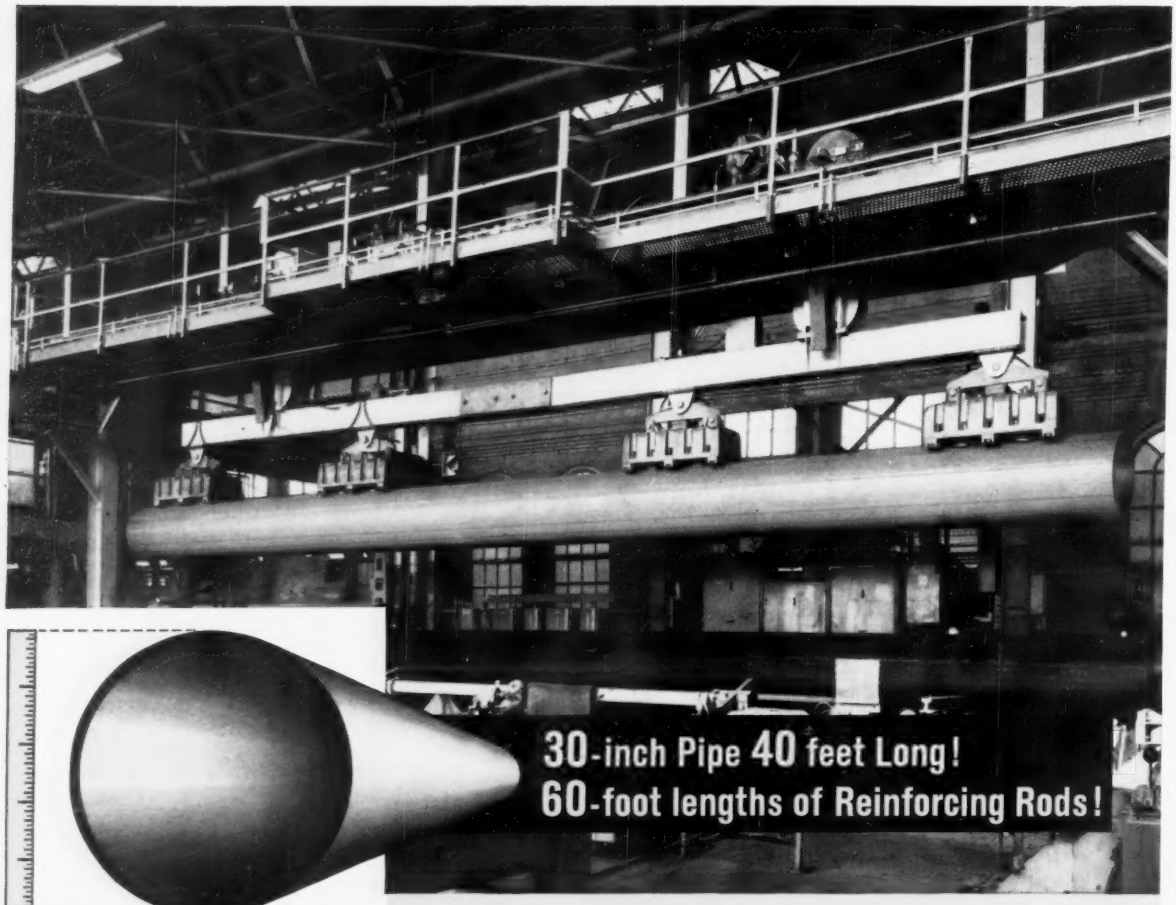


PIONEER INSTALLATION
Reinforcing rods, weighing up to 5 tons per bundle, are handled without slings ...without spacers between stored layers. EC&M magnets have narrow width to fit into production cradles and between storage rack posts.

ALL MOVED QUICKLY, SAFELY WITH EC&M MAGNETS!

At Bethlehem Steel Company's Line Pipe Mill in Steelton, Pa., pipe and rods are moved without chains, without slings, without ground men. The result—no bottlenecks!

For any handling requirement like this, EC&M has the right size and type of magnet. Let us prove that EC&M magnets can move your pipe and rods just as quickly, just as safely—and economically, too.

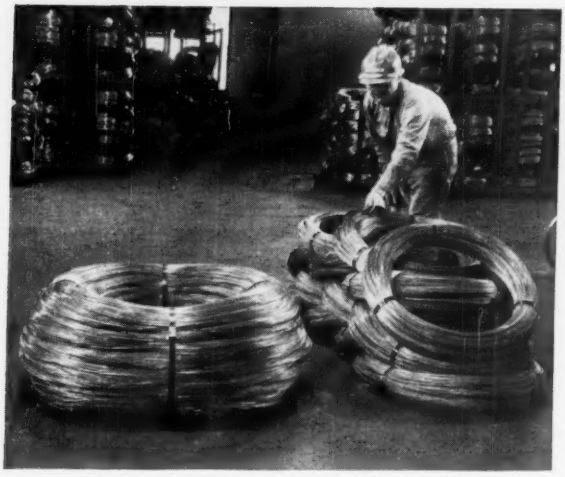
NEW BROCHURE 1311 fully describes these operations. Write for your copy. Square D Company, EC&M Division, 4500 Lee Road, Cleveland 28, Ohio.

SQUARE D COMPANY
EC&M DIVISION • CLEVELAND 28, OHIO
wherever electricity is distributed and controlled

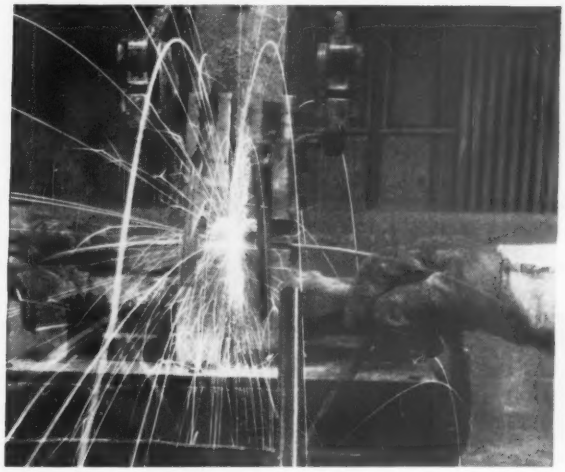
6670

Here's how Bethlehem Wire in heavyweight coils cuts your costs

Bethlehem heavyweight coils, with from 1,000 to 2,000 lb of wire in one continuous length, offer these cost-cutting advantages:

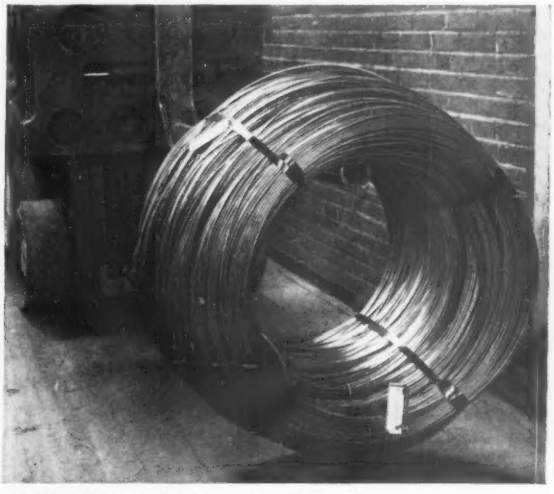


REDUCED MACHINE DOWN-TIME—By using the heavyweight coil, instead of 13 150-lb catchweight coils, you save a maximum of 12 costly machine shutdowns necessary every time you start a standard size coil.



LESS BUTT-WELDING AND COIL REMNANT SCRAP—In operations requiring the welding of coil ends, the time and cost of butt-welding is reduced. And there's less waste in the form of coil remnant scrap.

NO DEPOSITS . . . NO RETURNS—Returnable carriers are not needed with Bethlehem heavyweight coils. Carriers take up valuable storage space, involve extra paperwork, and tie up your cash.



MINIMIZED HANDLING COSTS—One man, operating a fork-lift, crane, or ram truck, can easily handle a heavyweight coil. Speedy unloading. Efficient stacking.

BUNDLED THE WAY YOU WANT THEM—We can supply our heavyweight coils with or without a pallet, for use on welded steel cores (rotating or stationary payoff).

Want more information? Get in touch with our nearest sales office. Or write to us at Bethlehem, Pa.

Steel *for Strength . . . Economy . . . Versatility*

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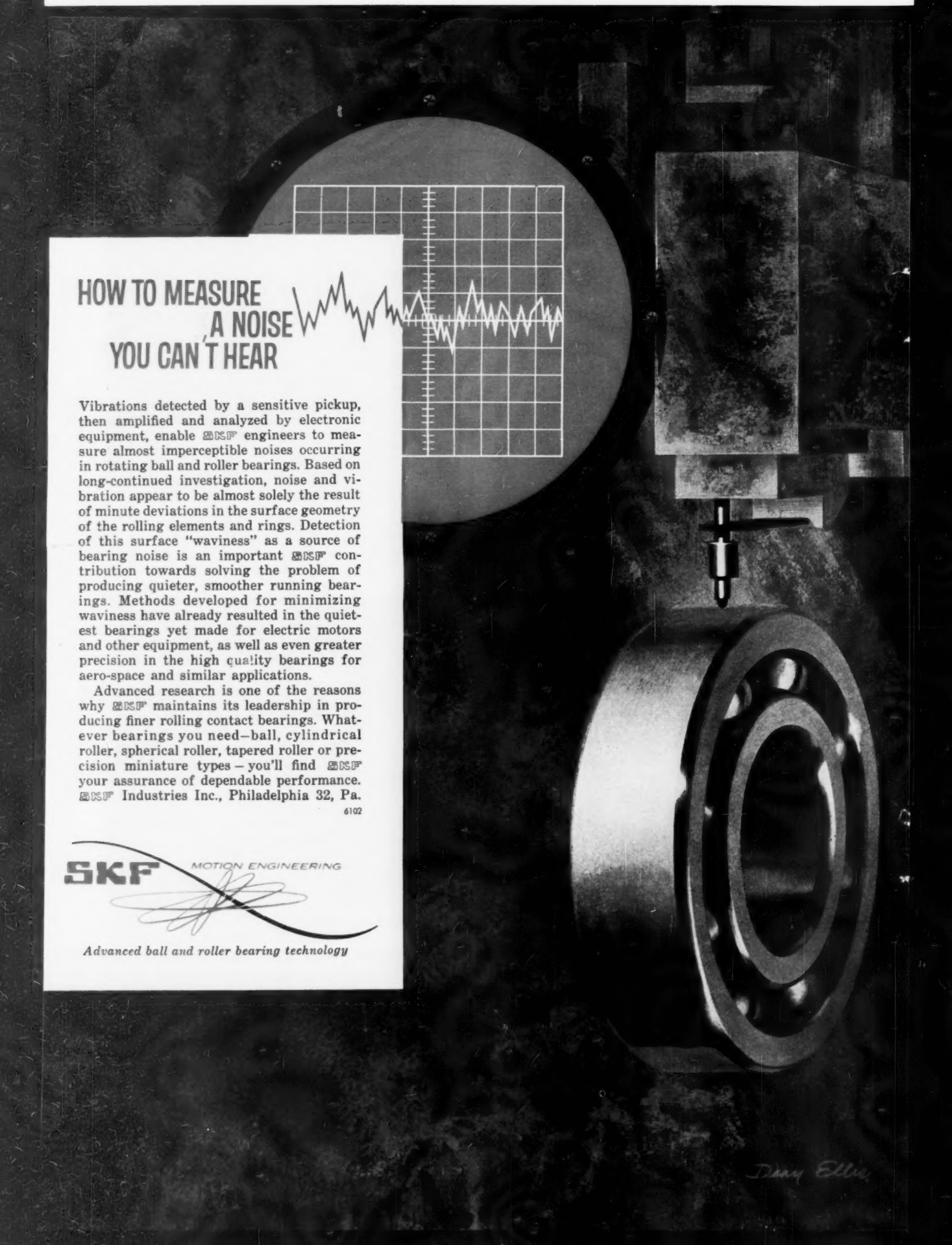

HOW TO MEASURE A NOISE YOU CAN'T HEAR

Vibrations detected by a sensitive pickup, then amplified and analyzed by electronic equipment, enable SKF engineers to measure almost imperceptible noises occurring in rotating ball and roller bearings. Based on long-continued investigation, noise and vibration appear to be almost solely the result of minute deviations in the surface geometry of the rolling elements and rings. Detection of this surface "waviness" as a source of bearing noise is an important SKF contribution towards solving the problem of producing quieter, smoother running bearings. Methods developed for minimizing waviness have already resulted in the quietest bearings yet made for electric motors and other equipment, as well as even greater precision in the high quality bearings for aero-space and similar applications.

Advanced research is one of the reasons why SKF maintains its leadership in producing finer rolling contact bearings. Whatever bearings you need—ball, cylindrical roller, spherical roller, tapered roller or precision miniature types – you'll find SKF your assurance of dependable performance. SKF Industries Inc., Philadelphia 32, Pa.

6102

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Advanced ball and roller bearing technology

Any way you look at Roebling Royal Blue Wire Rope, there's real savings in it for you. In its inner and outer uniformity. In its *extra*-high strength. In unison, these qualities provide unrivalled resistance to abrasion, impact, crushing and tough sheave pressures. Royal Blue—inside and outside—goes on paying off for you when lesser wire rope would need replacing. Find out more from your wire rope distributor, or write for free booklet to Roebling's Wire Rope Division, Trenton 2, New Jersey.

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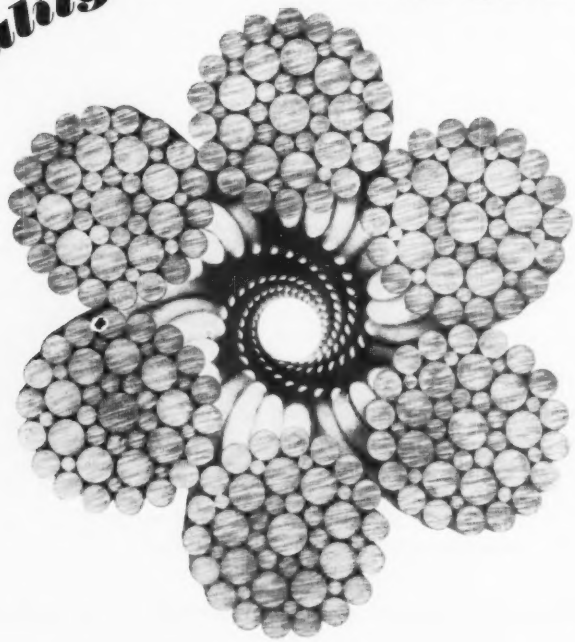


We put a lot of work into it—
You get a lot of work out of it

Engine Handling

MADE EASY IN NEW GIANT TEST BUILDING

Some of the many test cells served by easy rolling Cleveland Tramrail hand-propelled cranes with electric hoists of two and four tons capacity. Note the white glazed tile walls that aid in keeping the entire test area immaculate.

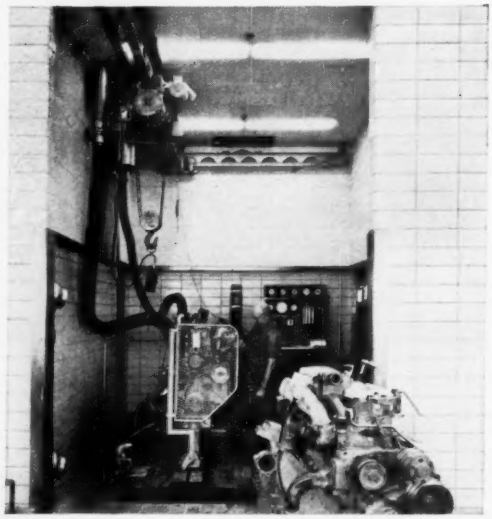
As a leading manufacturer of automotive diesel engines in the United States, powering more on-highway trucks than all other U. S. diesel builders combined, Cummins Engine Company, Inc., Columbus, Indiana, is continually improving and expanding its facilities to insure the highest quality of workmanship. The firm's new 300,000 square foot Test Building was a move in that effort. It was designed primarily for engine testing and provides the most modern facilities in the diesel industry.

Cummins has had long, favorable experience with Cleveland Tramrail equipment in many of its hard-working shop areas. This was an important consideration in its selection for the new Test Building. All individual engine test cells, plus the larger cells for testing marine engines, generator sets and power units, are equipped with individual Tramrail cranes. Other areas of the building were also provided with many Cleveland Cranes.

Write for free booklet 2008

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment



There is no delay in handling engines in and out of a test cell. The man in each cell can take care of this easily and immediately whenever desired with the crane in the cell.

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7864 E. 290 ST. • WICKLIFFE, OHIO

Accent on Washington

Washington Editor Jack Botzum keeps track of the capital angle on labor for STEEL's readers and has been particularly active in contributing to our weekly coverage on the auto talks.

He keeps you up to date on a lot of other matters, too, as his column, "Windows of Washington," on Page 32 testifies.

Before joining STEEL in 1956, Jack was an editor with Babcox Publications in Akron. He has also served as an instructor at the University of Connecticut where he did graduate work. He was graduated from the University of Akron and was in the U. S. Army for two years.

Accent on Depreciation Reform

A speech on depreciation reform by Associate Managing Editor John Morgan is reprinted in the July 10 edition of the *Congressional Record*. The talk, given June 17 in Boston before the annual meeting of the National Association of Metal Finishers, was a summary of recent articles in STEEL on the subject. The speech was inserted in the *Record* by Rep. Thomas J. Lane (D., Mass.).

We Like It This Way

Metallurgical Editor Ed Case and Assistant Editor John Teresko blue penciled out a phrase in their article on plating errors (Page 56) that we think reads better in erroneous than in corrected form.

They had solicited comments for the story from Battelle Memorial Institute. The good people down there obliged, but were so rushed that they dictated their replies and sent the disc to us to transcribe.

Here's the stenographer's interpretation of one statement: "He can't take every souse here and make a silk purse out of it."

International Magazine

The pilot issue of STEEL INTERNATIONAL is out now. Regular monthly publication will begin with the January, 1962, issue.

Editorially, its purpose is to inform the Free World's managers in metal producing and metal using plants about U. S. managerial, marketing, and technical developments. Commercially, its aim is to help U. S. companies reach the growing Free World markets with their advertising.

A special editorial staff and STEEL's regular editors will edit the magazine. STEEL's business staff will handle sales.

STEEL INTERNATIONAL will reach all industrialized nations of the Free World, except the U. S. and Canada which will continue to be served by STEEL. The new publication will have a controlled circulation of 17,000, going primarily to companies overseas that employ 100 or more, or are capitalized at the equivalent of $500,000 or more. It will be written primarily in English. Two, eight-page sections that summarize editorial contents will be translated into German, French, and Spanish.

STEEL's co-publishers, Walt Campbell, editor, and Sal Marino, business manager, have been studying the problem of foreign distribution for several years. They chose the establishment of STEEL INTERNATIONAL as the most efficient way to reach overseas readers. They'll have the same titles and responsibilities for the international publication as they do for STEEL.

Winner

W. T. Kaarlela, a metallurgist for General Dynamics/Ft. Worth (Tex.) Div., General Dynamics Corp., has earned a second $500 from STEEL. He got his first $500 as the November winner in our 1960 Usership Idea of the Month contest. An article on surface carbon in steel (Nov. 28, 1960, p. 118) sparked an idea with him.

He has just submitted proof that the idea bore fruit, so the second award is his.

Question

"IITYWYBMAD?"—can you guess what that stands for?

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

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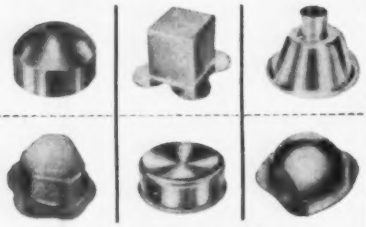

Closest tolerances adhered to in all metals, including MU METAL, BRASS, INCONEL, ALUMINUM, COPPER, CARBON STEEL, STAINLESS STEEL, NICKEL, MAGNESIUM, TITANIUM, SILVER, SPECIAL ALLOYS, HAYNES STELLITE.

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METAL CRAFTSMEN SINCE 1924

STEEL
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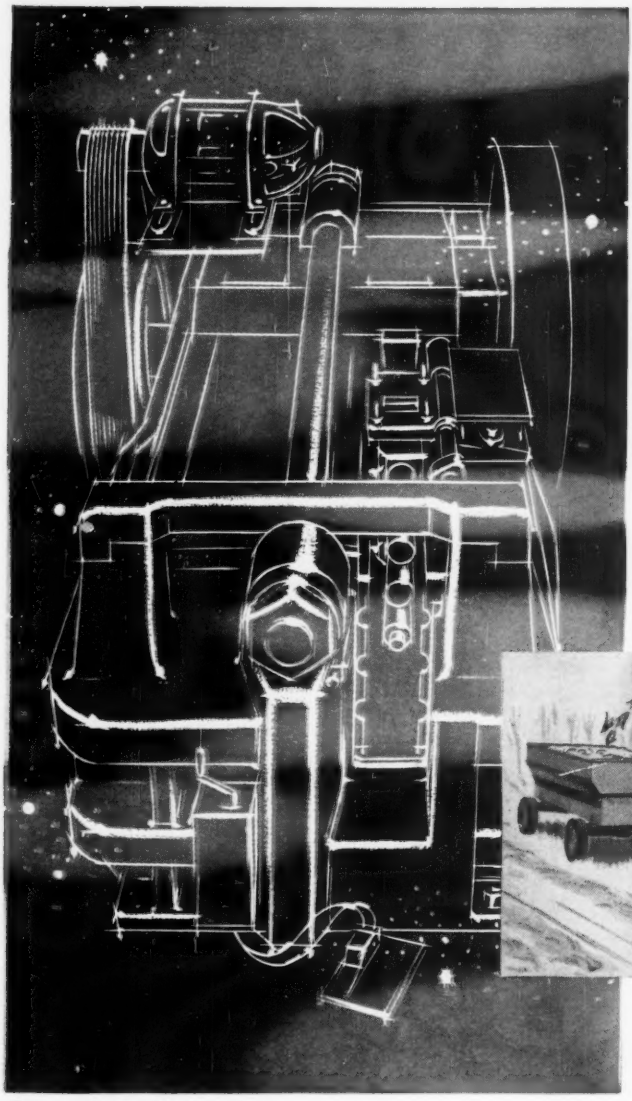

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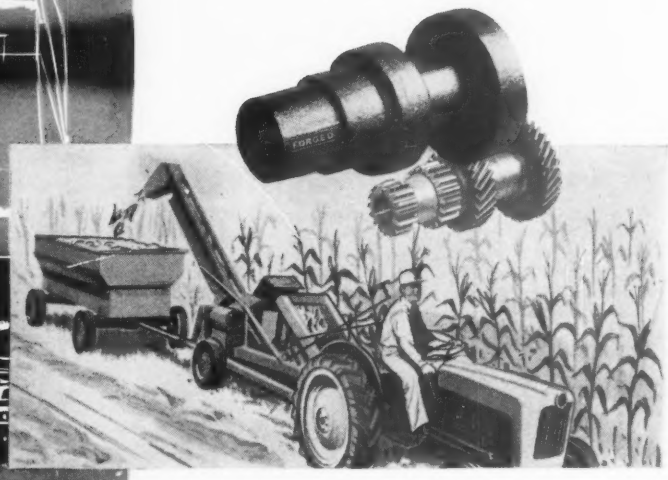

Upsetter, or horizontal forging machine

Gear blanks for tractor and farm implement transmissions are designed to be upset-forged, usually with integral forged stub shafts. Forging gives these vital parts maximum resistance to gear-clashing shifts. Transmission life can be equal to equipment life when gears are FORGED.

When you *design with forgings* right from the start, you take full advantage of the many benefits which only forgings offer: highest ratio of strength to weight . . . highest resistance to impact, shock, vibration, torsion . . . preferential orientation of flow lines in the forging to concentrate strength where required . . . absence of wasteful inclusions and voids.

Forged parts start out as *better* metal . . . are made *even better* by the hammer blows or pressures of the forging process. Write for literature to help you design, specify, and procure forged parts.

When it's a vital part, design it to be FORGED

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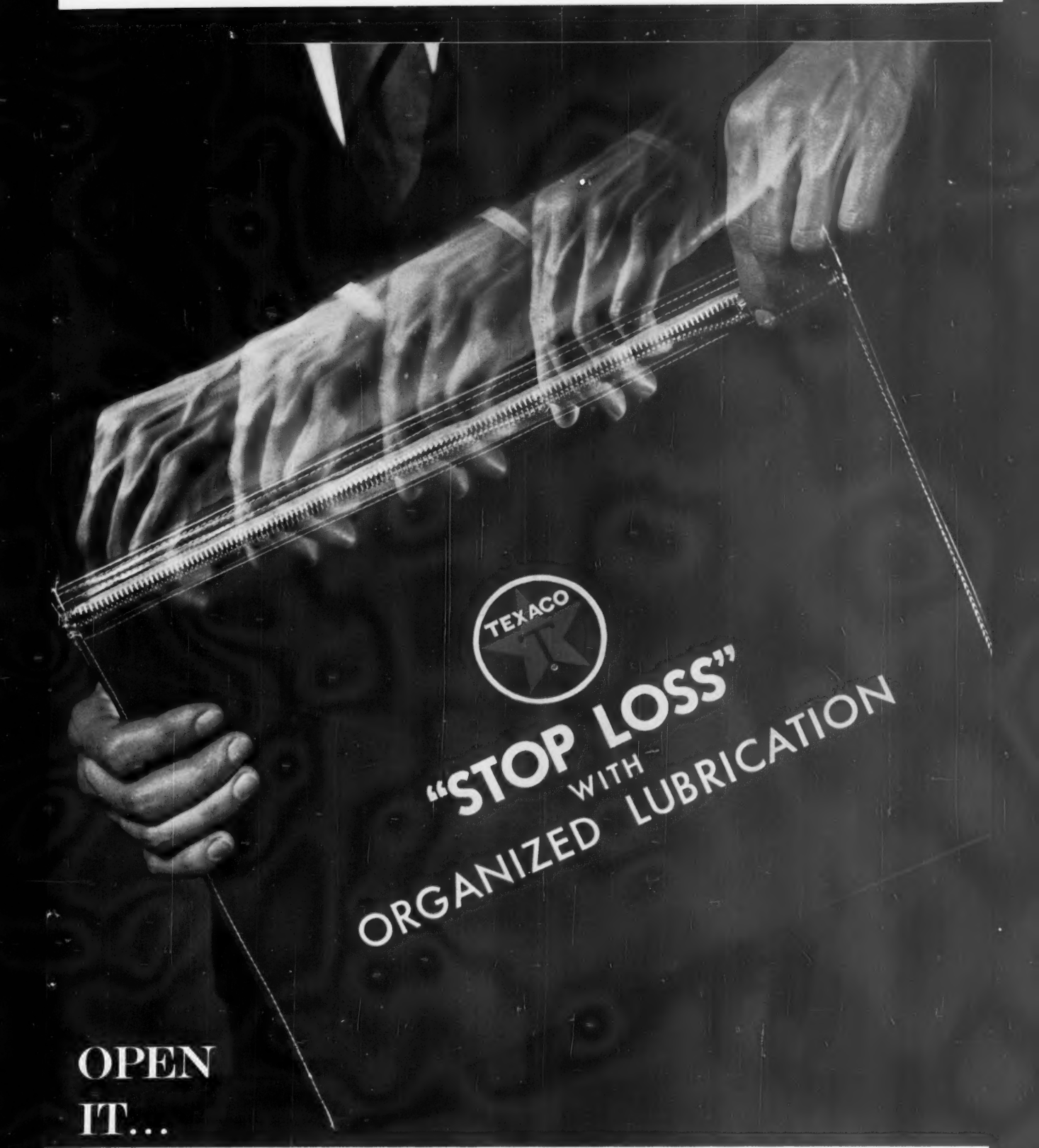

OPEN IT... FOR UP TO 4% EXTRA NET PROFIT

In the Texaco man's briefcase is a plan for cost control through organized lubrication—Texaco's "Stop Loss" Program. Management in many different industries is already using it to cut operating costs. The resulting savings go directly into profits. Up 4% is the average. To find out how you can turn excessive costs into profit, write for our informative folder: "How to Starve a Scrap Pile." **TEXACO** INC., 135 East 42nd Street, New York 17, N. Y. Dept. S-202

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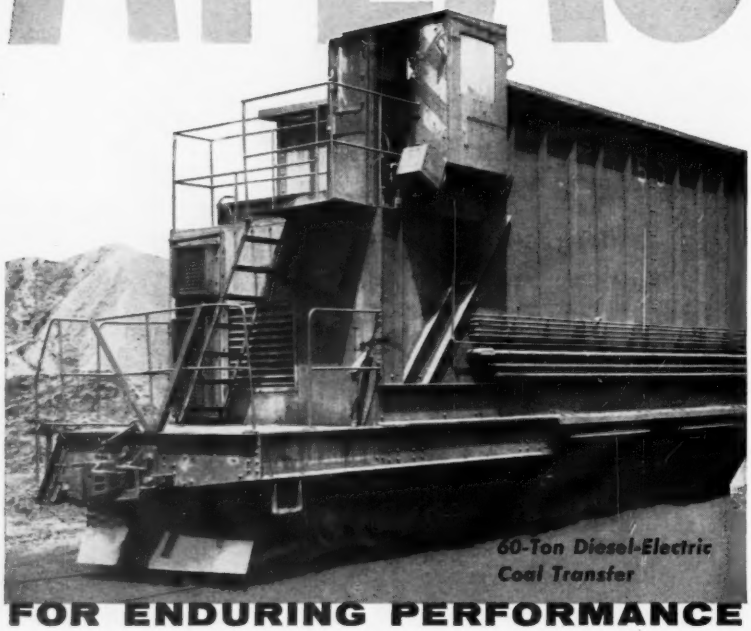

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CALENDAR
OF MEETINGS

Aug. 15-17, Cryogenic Engineering Conference: University of Michigan, Ann Arbor, Mich. Conference secretary: K. D. Timmerhaus, Department of Chemical Engineering, University of Colorado, Boulder, Colo.

Aug. 16-19, Society of Automotive Engineers: National West Coast meeting, Sheraton Hotel, Portland, Oreg. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: Joseph Gilbert.

Aug. 22-25, Western Electronic Show and Convention: Cow Palace, San Francisco. Convention director: Calvin K. Townsend. Business office: 1435 La Cienega Blvd., Los Angeles 35, Calif. Northern California office: 701 Welch Rd., Palo Alto, Calif.

Sept. 10-12, Steel Service Center Institute: Great Lakes regional meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Institute's address: 540 Terminal Tower, Cleveland 13, Ohio. Executive vice president: Robert G. Welch.

Sept. 11-12, American Supply & Machinery Manufacturers' Association Inc.: Industrial distribution conference, Statler Hilton Hotel, Cleveland. Association's address: 2130 Keith Bldg., Cleveland 15, Ohio. Business manager: W. B. Thomas.

Sept. 17-21, Non-Ferrous Founders' Society: Annual meeting, Shawnee Inn, Shawnee-on-Delaware, Pa. Society's address: 1604 Chicago Ave., Evanston, Ill. Executive secretary: Herbert F. Scobie.

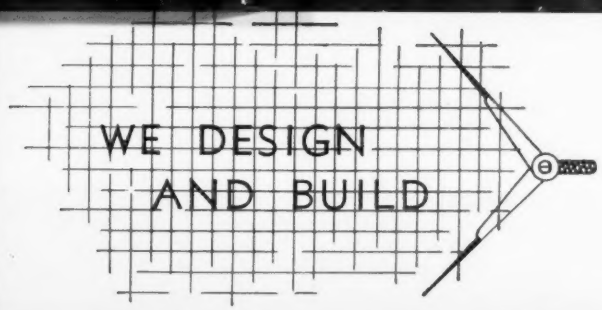
Sept. 18-20, Standards Engineers Society Inc.: Annual meeting, Hotel Sherman, Chicago. Society's address: Box 281, Camden 1, N. J.

Sept. 24-26, Steel Founders' Society of America: Fall meeting, The Homestead, Hot Springs, Va. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Sept. 24-28, Pressed Metal Institute: Annual meeting, Grand Hotel, Point Clear, Ala. Institute's address: 3673 Lee Rd., Cleveland, Ohio. Managing director: J. D. Keith.

Sept. 25-28, American Welding Society: Fall meeting, Adolphus Hotel, Dallas. Society's address: 33 W. 39th St., New York 18, N. Y. National secretary: Fred L. Plummer.

Sept. 25-28, Association of Iron & Steel Engineers: Annual convention, Penn-Sheraton Hotel, Pittsburgh: Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.



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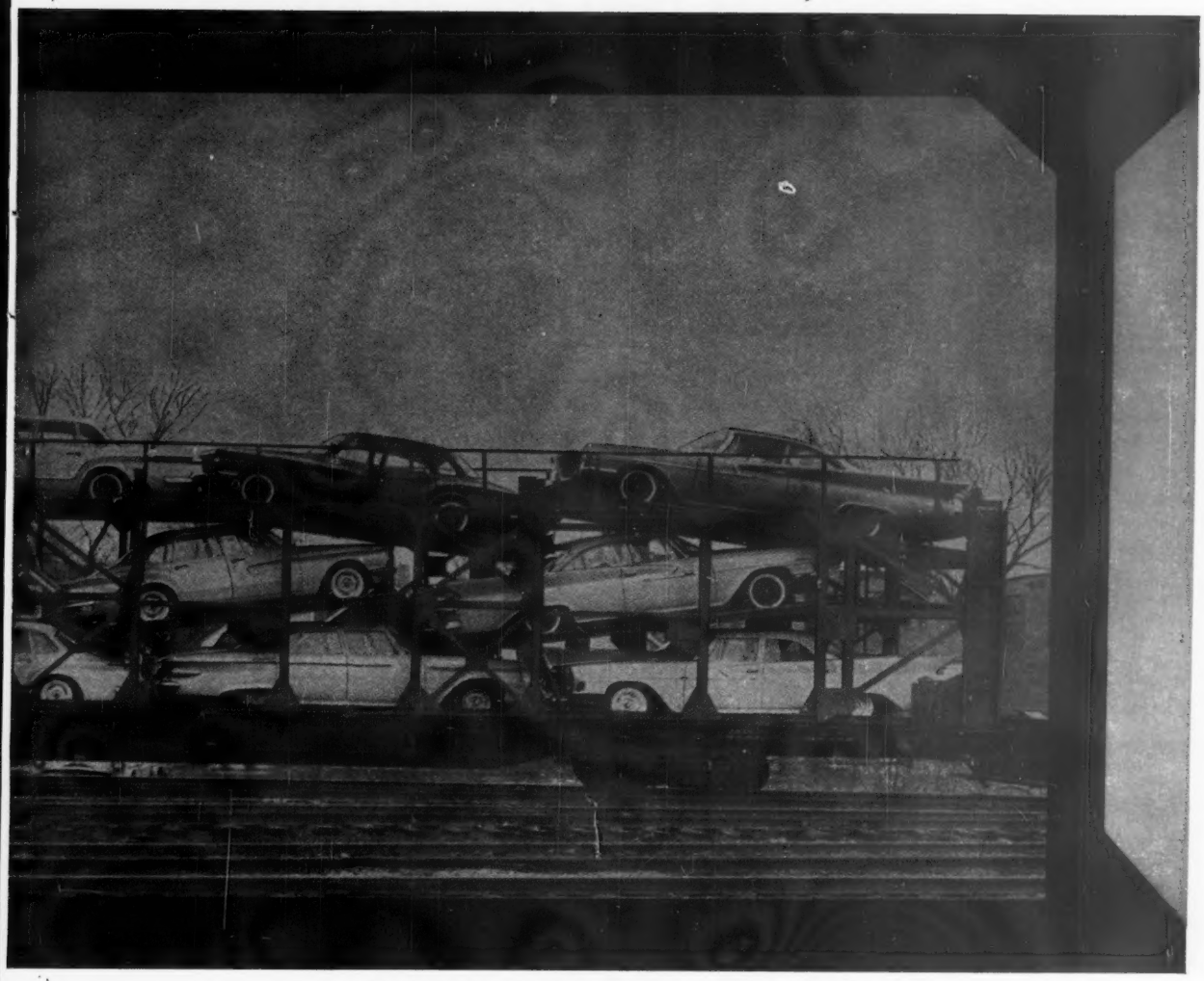
That's the Beauty of Steel

Bringing important new economies to rail shipment of automobiles, this new tri-level auto carrier holds twelve standard cars or mixed loads of 14 standards and compacts. Capacity is increased up to 75%. A unique system of hydraulically positioning the vehicles on three levels gives a clearance of only 16 feet 8 inches, permits use in areas formerly limited to bi-level unit operation because of clearance requirements. ◆ Key feature of the Multi-Car Carrier is the movable decks on which the cars ride. Made of GLX-W columbium-treated steel, the decks are raised and lowered by built-in hydraulic lifts, actuated by a portable power unit. Here light weight was essential, in order to reduce the operating power requirements. Yet great strength was necessary, too, to support the payload. Finally, design of the decks called for eight bends in each section. So formability was also a must. ◆ GLX-W met and exceeded all these requirements. It gives 50-100% greater strength than mild carbon steel, so builder Whitehead and Kales could get the required strength with less weight. Deck operating units need less power,

Great Lakes Steel is a Division of

STEEL



Multi-Car Carrier built by Whitehead and Kales for Multi-Car Corporation, Detroit, Michigan

TRI-LEVEL AUTO CARRIER

and total weight is reduced approximately 5,000 pounds or 10%. Production is more economical, too, because the ductility and formability of GLX-W permits four of the bends in the deck to be performed in one press operation. ◆ The GLX-W series of high-strength steels consists of fine-grained, semi-killed mild carbon steels, treated with varying amounts of columbium. The high strength of GLX-W permits designers to reduce the amount of steel and effect considerable cost savings when replacing mild carbon steel. GLX-W steels have a low carbon content and are readily weldable and formable. GLX-W steels are available at four minimum yield strength levels: 45,000, 50,000, 55,000 and 60,000 p.s.i. and in sheets, plates and bars. For complete technical information, write Great Lakes Steel Corporation, Product Development, Dept. SM-9, P. O. Box 7310, Detroit 2, Michigan.

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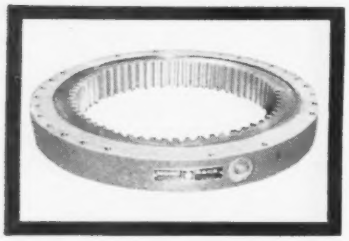

Amweld flash butt-welded rings can cut your costs!

Amweld flash butt-welded rings are today lowering costs on gear blanks, bearing races, frame rings. Also rings for OEM, such applications as jet aircraft engines, missiles, and scores of other applications. Savings to Amweld customers totaled over one million dollars last year alone!

Here's your opportunity to reduce the cost of your circular components and assemblies. Amweld's close-tolerance fabrication of flash butt-welded rings cuts waste of materials, cuts out unnecessary machining. And Amweld's ability to flash weld materials to Aeronautical Material Specifications offers proof of Amweld quality.

Investigate now! To see how Thew Shovel Company makes profitable use of Amweld flash butt-welded rings, mail coupon below for your free copy of Application Study R-1. Then let your Amweld representative show you how much flash butt-welded rings can cut the cost of your circular components!

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Amweld supplies flash butt-welded rings for the races of "Mono-Race" connections, designed and manufactured by The Thew Shovel Company's Mono-Race Division, Lorain, Ohio. This 10 ton hydraulic crane, manufactured by Grove Manufacturing Company, Pennsylvania, is a typical application of a Mono-Race connection.

Blough Sees 'Moderately' Better Business

Roger M. Blough, chairman, U. S. Steel Corp., looks for "moderately and consistently better business" over the rest of the year. He expects second half steel shipments to run around 40 million tons vs. 31.4 million in the first half for a yearly total about equal to last year's mark. He expects 1961 ingot production to about equal last year's 99.3 million tons. He anticipates an inventory buildup of around 2 million to 3 million tons in the second half.

Buds of Better Business Begin to Bloom

It now seems certain that metalworking will experience a strong upturn in the second half. Spending by all three national segments—consumers, business, government—have turned up and faster increases are forthcoming, if business indicators prove accurate. Examples: Personal income in June jumped to a seasonally adjusted annual rate of $416.5 billion—$3.5 billion above the May mark and $13.5 billion above the recession low in February . . . June shipments by makers of durable goods rose 1 per cent, seasonally adjusted. Orders declined 1 per cent from the May level, but remained 2 per cent above the mark for the year-earlier month . . . Housing starts in June reached 136,900—up 6300 from May and 8700 from June, 1960 . . . The primary metals industry operated at 70.5 per cent of capacity in June vs. 69.4 per cent in May . . . June sales by members of the National Industrial Distributors' Association rose 4 per cent above the May level to only 2 per cent below the year-ago mark.

Tips on Trimming Your Shipping Costs

"Transportation costs generally have more than doubled in the last decade," reports Stanley H. Brewer, professor of transportation, University of Washington, Seattle. Material flow costs are the third highest business costs—outranked only by labor and the materials themselves. And—the rate of increase in material flow costs have far exceeded the rate of production costs in many industries. Shippers, who spend $50 billion annually for transportation, are taking many routes to lower costs (Page 28).

Allegheny Ludlum Quits Steel Labor Negotiating Group

The specialty steel producer has withdrawn from the Steel Companies Coordinating Committee, which spearheaded the industry's negotiations with the United Steelworkers in 1959. The company points out that the move was made on a friendly basis, well in advance of 1962 bargaining. Allegheny Ludlum, tenth steelmaker in sales last year, was the only nonintegrated producer on the committee. When the industry was struck in 1959, many of

the company's competitors—40 per cent of the stainless industry and 50 per cent of the tool steel industry—continued to operate.

Glowing Future Predicted for Curtain Walls

"Use of metal curtain walls is growing so rapidly that if present trends continue, 25 per cent of the total outside wall area of all nonresidential buildings being erected by 1963 will be clad in metal." So says Olin Mathieson Chemical Corp., which has just completed a market survey. The firm says curtain walls accounted for about 15 per cent of exterior wall area installed last year.

Dues Rebel Leader Ousted by USW Local

Nicholas Mamula, top insurgent in the United Steelworkers, has been removed from office as president of the 12,000 member Local 1211 at Jones & Laughlin Steel Corp.'s Aliquippa (Pa.) Works. Members of the local voted (161 to 144) on July 20 to uphold the verdict of a trial board which had convicted him of misconduct in office and violation of the union's constitution. He was suspended and ordered to pay a $2000 fine. Ironically, the charges were preferred by Louis "Blackie" DeSena, his financial secretary, former friend, and chief of defense in a 1958 "dual unionism" trial. Mr. Mamula says the case against him was rigged, and he vows to carry his fight into federal court under the Landrum-Griffin Act.

Radio System to Be Run by Sun

An engineer at Hoffman Electronics Corp. shows the elements of CLEAR, a radio-public address system powered by silicon solar cells mounted with the loudspeaker. It's designed for use in isolated villages abroad where electric power is lacking. The International Co-operation Administration has already ordered four systems for trial installations abroad. Batteries store power for night use.

Color TV Sales Set to Soar

Radio Corp. of America predicts that industry sales of color TV sets during 1961 will be "more than 50 per cent higher than those of last year." RCA's sales in its first half were up 20 to 25 per cent over the like 1960 period.

Business Failures Drop; Incorporations Rise

Business failures declined 9 per cent in June, but they held above the level for any month in 1960 or 1959. Among manufacturers, the toll dropped to a

nine-month low, with much of the improvement in the metalworking industries. New business incorporations edged up in June to reach the highest point, seasonally adjusted, since August, 1960.

Experts Give Electroplating Advice

Electroplating experts at Battelle Memorial Institute say that you're passing up major gains in quality and cost reduction benefits if you don't develop a close relationship with the plating firm that serves you. Dr. C. L. Faust (photo) suggests that purchasers look at the plated surface as a material and provide specifications for properties needed to do a specific job—just as you would do in buying a metal. The experts also point to new information on commonly used platings (see Page 56).

Canadian PAs See Better Business

Higher production and employment, an increased volume of orders, stable inventories, and limited price changes—that's the picture revealed by the June survey of the Canadian Association of Purchasing Agents. The survey also discovered that delivery times are lengthening.

NICB Survey Predicts Better Second Half

Dollar billings for the second half of '61 are expected to be greater than those of the first half for 3 in 4 of the 220 manufacturing firms surveyed by the National Industrial Conference Board. Nearly 4 in 5 firms predict an increase in orders. About half look for pretax profits to rise; 43 per cent foresee an increase in employment; 42 per cent expect 1961 capital outlays to exceed those of 1960.

Design for Profit Growth

R. R. Miller, president, Precision Metalsmiths Inc., Cleveland, suggests using suppliers' design skills as a way to boost your earnings. Another bit of advice: Plan the material, the process, the finish, and the delivery requirements during the design stage. For other tips, see the fifteenth article in STEEL's 1961 Program for Management (Page 35).

Australia May Get Stainless Strip Facility

Atlas Steel Co. of Canada is considering opening a plant in Australia to produce stainless steel strip. Company executives have been in Australia discussing the venture with government officials. The facility would probably be in Sydney. The nation now has one stainless strip producer.

Wholesale Prices Fall; Consumer Prices Rise

The Labor Department's wholesale price index (1947-49 = 100) dropped 0.4 per cent in June to 118.2. The index has declined 1.4 per cent in the last three months and is at the lowest level since November, 1957. The department's consumer price index (1947-49 = 100) rose 0.2 per cent to a record 127.6

STEEL The Metalworking Weekly

July 31, 1961 Vol. 149 No. 5

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per cent in June. The department reported, however, that a lengthening workweek and rising wages more than offset the price rise to give consumers their most potent buying power since December, 1959.

Smiley Sees U. S. Losing Export Leadership

By 1970, the U. S. will have only 13.4 per cent of the Free World market for merchandise exports (vs. 18.3 per cent now) and will fall to the position of fourth largest exporter, Ralph E. Smiley, president, Booz, Allen & Hamilton International Inc., told the Inter-American Industries Conference in Chicago, held in connection with the 1961 Chicago International Trade Fair. The major reason for the decline, Mr. Smiley said, is the rise of trade areas.

Go to Africa, Young Man, and Think Small

It could well be that manufacturers of consumer items in the U. S. are missing a chance by not going on a small scale into such preferred and more stable Afro-Asian areas as Senegal, Nigeria, Tunisia, Tanganyika, the Brazzaville Congo, Malaya, Singapore, and Thailand, asserts S. J. Rundt, New York consultant on international business. He points out that the Germans, Italians, and Japanese believe that the developing nations need, to start with, fewer giant power dams and steel complexes and more small ($50,000 to $100,000) factories to produce basic consumer goods.

Iron Ore Find in Queensland

An iron ore deposit has been discovered in Queensland, Australia, near the Kianga coal fields, 40 miles from a proposed railway to Gladstone. Premier Nicklin says this gives Queensland its first real chance for the establishment of a steel plant. He reports that the deposits are being surveyed, and if they prove sufficient, the government will try to attract foreign capital.

Straws in the Wind

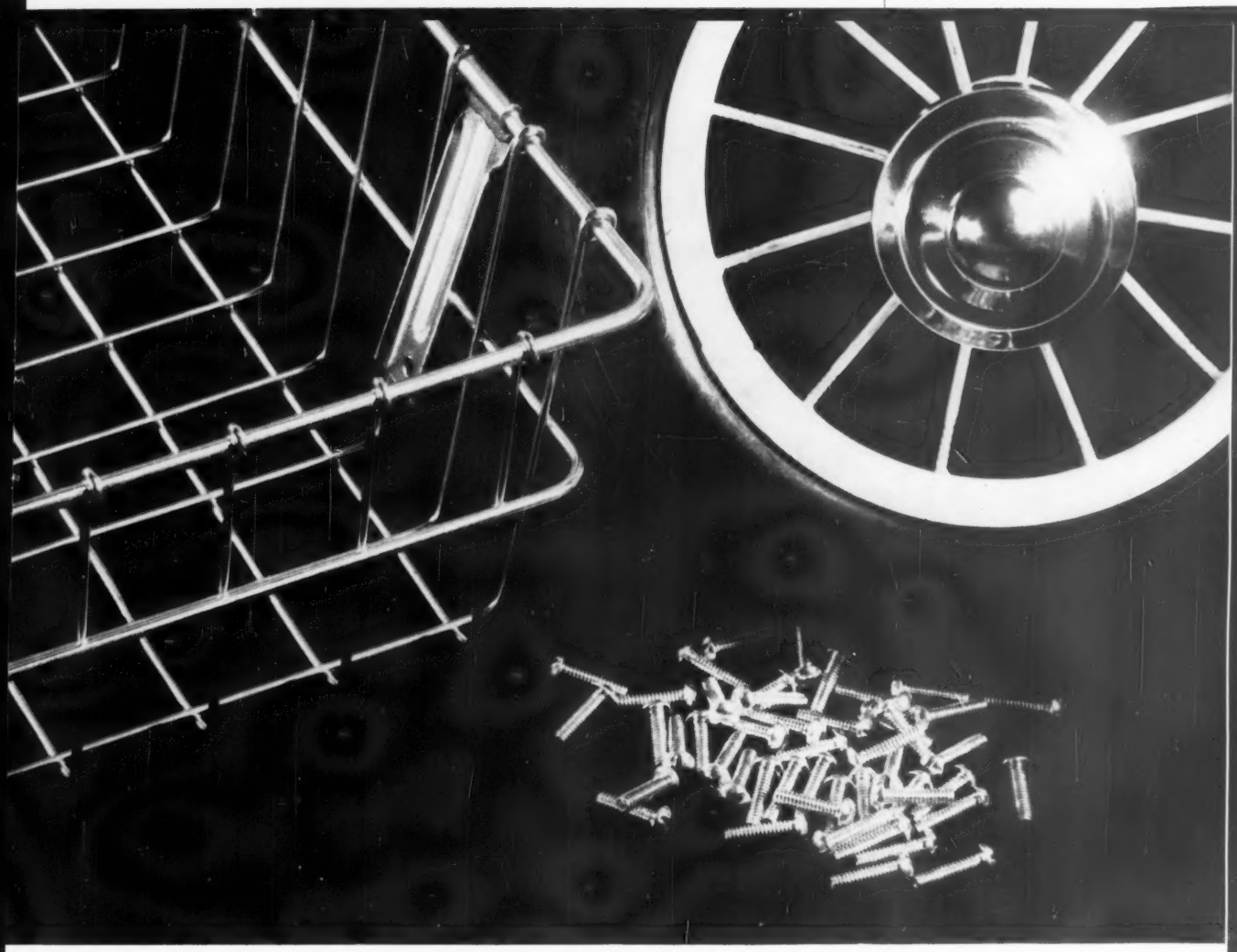
Deliveries of new freight cars totaled 3142 in June vs. 3360 in May; June orders fell to 1214 from 3666 in May, the American Railway Car Institute reports . . . June bookings by members of the American Institute of Steel Construction (structural steel fabricators) fell to 297,555 tons from May's 391,703 tons, but held within 1 per cent of the June, 1960, mark.

Metalworking Pulse

The Business Trend: Opposite forces among the components of STEEL's industrial production index about balance out as the trend line continues to move sidewise. The direction isn't apt to change much in the next few weeks. **Autos:** The downtrend in production continues as more facilities are halted for model changeover. Only Ford and scattered Chevrolet plants are still turning out 1961 model cars. **Steel:** Ingot output held to about the week-ago level.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49 = 100)
  Week ended July 22 .... **164†**
  Year ago **152**
  Details on Page 45
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended July 29 . **75,000***
  Year ago **107,019**
  Details on Page 42
- **STEEL INGOT OUTPUT (TONS)**
  Week ended July 29 **1,860,000***
  Week ago **1,858,000**
  Details on Page 92

†Preliminary. *Estimated.



Only M&T offers such a complete "package" for high quality, low cost zinc finishes

A zinc finish on certain products, such as the ones illustrated, is often a better choice than a painted finish . . . or improperly applied bright chromium. That's because it protects the base metal longer under corrosive conditions. What's more, it is applied at only a fraction of the cost of a chromium finish. For such a high quality low cost finish, M&T now offers you this complete package:

First, there's a new M&T Zinc Plating Process. It includes unique M&T Zinc Brighteners. Not only do you plate with remarkable brilliance, but also cover items uniformly, even in recesses.

Then, you have a complete choice in M&T chromate treatments. Unichrome Clear Dip imparts chromium-like lustre and color. With M&T's Dyed Dips, you can produce a rainbow of metallic colors. And there are others for black, olive and brass colored finishes; in fact, the M&T line of Unichrome Chromate Dips is among the broadest to be found.

Finally, to increase protection against wear as well as corrosion, if the service requires it, there's a group of outstanding Unichrome Clear Enamels. These are no ordinary organic coatings. They're designed for metals, and have proved their quality and durability in exacting jobs for over 20 years.

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PHOTO: COURTESY G-E DISHWASHER DEPT., LOUISVILLE, KY.

HOW BIG PAYLOAD LPR's SHRINK HANDLING COSTS —Take the receiving operation itself: Users report that LPR's consume half the time required for conventional bundles of equivalent total weight; more LPR wire can be stocked per cubic foot, saving storage space and making it safer, easier to get at and faster to handle . . . housekeeping is improved, inventory control simplified; fewer stock transfers between storage and production departments lighten plant traffic. *LPR's save you time; LPR's save you money.*

HOW DSC LONG PRODUCTION RUN LPR's SLASH FABRICATING COSTS– Users report: Fewer coil changes and setup adjustments reduce downtime, increasing machine-man-hour output; LPR's put new vigor into older machines so they produce more efficiently, let newer, faster equipment perform at peak. *Greater productivity with LPR's means lower operating costs.*

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These Long Production Run savings are NET TO YOU because you pay nothing extra for LPR advantages.

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Modernization Loans

Earlier this month, this magazine reported (July 3, p. 26) a new approach to encourage industrial modernization and re-equipment. Under the proposal, the government would set up a plan to guarantee 80 per cent of private loans to industries to finance capital equipment purchases. The program would be similar to the Federal Housing Administration's loan guarantee program for home building.

To avoid any cost to the government, a 1 per cent premium would be charged on the guarantees. Interest rates would be set 0.5 per cent above the government borrowing rate. Loan terms would be seven or eight years.

The program was designed to aid companies, particularly those in the middle size range, to raise their production efficiency and enable them to compete in the world market. Advocates of the loan guarantees found in preliminary surveys that many medium sized plants want to modernize but lack the necessary capital. Often their capital requirements are too low to justify tapping the public markets.

We believe the modernization loan program is a good proposal, one that should be pushed by the administration and enacted by Congress.

Readers agree.

The top executive of a company operating three metalworking plants says: "While true depreciation reform rather than the hard-to-understand and hard-to-evaluate Surrey plan is still urgently needed, the idea of government guaranteed loans appears to be an excellent one.

"Like many firms, we really don't fit into the 'small business' pattern, but are nevertheless quite removed from the possibility of obtaining expansion funds by public flotations of loans or stock issues. The banks, on the other hand, like to stick with short term business which does not lend itself too well to machinery purchases."

A manufacturer of woodworking machinery points out his industry has suffered badly from foreign competition and is seeking to develop new products to serve other industries. The handicap is lack of capital to purchase the necessary new equipment. He believes the modernization loan program would be the answer.

We hope the administration takes enough time out from foreign aid deliberations to formulate a little aid for the home folk.

Walter J Campbell

EDITOR

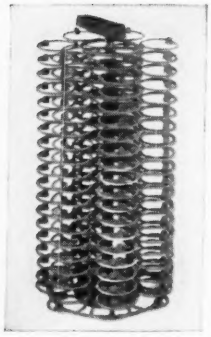
THE EDITOR VIEWS

Cast iron parts, produced by Perfect Circle's unique casting techniques, are used in critical wear points in both cast iron and non-ferrous engines. Cylinder liners are centrifugally cast, piston inserts and rings are produced by the stacked mold process. Gray iron valve guides are virtually a must for engines with non-ferrous cylinder heads. In each case, Republic Pig Iron is the base metal. Simple economics dictate the use of cast iron parts to resist wear at critical points.

REPUBLIC PIG IRON SPECIFIED FOR STACKED MOLD, CENTRIFUGAL CASTING

Uniform Chemistry, High Quality are Ideal for Unique Processes

In these two casting processes—stacked mold and centrifugal—Perfect Circle Corporation maintains stringent quality control programs. Control begins with the selection of pig iron. To suit Perfect Circle's metallurgists, the iron must have a perfectly uniform chemical composition with exact graphite distribution, and be of consistent high quality. To produce the gray iron parts on the opposite page, by the casting methods described below, Perfect Circle selected Republic Pig Iron as the base metal.

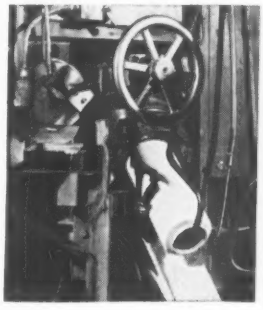


STACKED MOLD

In this process, stacks of green sand molds move along conveyors to the pouring station. Metal may come direct from a cupola or from an electric furnace. As the stacks cool they move to the shake-out station, where the cast "Christmas trees" are lifted and shaken free of the copes and sand.

By this process, Perfect Circle is able to produce several hundred castings at one pour. Dimensions are limited only by the depth and diameter of the cope.

CENTRIFUGAL



This process begins with installation of a permanent mold into a spinner where it is heated, spun to an interior force of 120 gravities, and coated. A measured weight of metal is poured into the mold. Through precise control of the mold temperature and the coating, the cooling rate is regulated to produce the desired microstructure. The spinning process squeezes gases and nonmetallic impurities out of the metal, and continues until the casting temperature drops to 1500°–1700°. The finished casting is then removed.

The castings are end-cropped to length and machined. The process allows a significant reduction in scrap loss, stock removal allowances, machining time, and costs.

REPUBLIC'S COMPLETE FOUNDRY ENGINEERING SERVICE is available to all foundries without obligation. Republic Foundry Service Engineers can supply ideas, suggestions, and information to benefit every department of your foundry operation. They can recommend, from industry's most complete line of merchant pig iron, the grade best suited to your requirements: Chateaugay; Northern Foundry, Malleable, Bessemer and Basic; Southern Malleable, Foundry and Basic.

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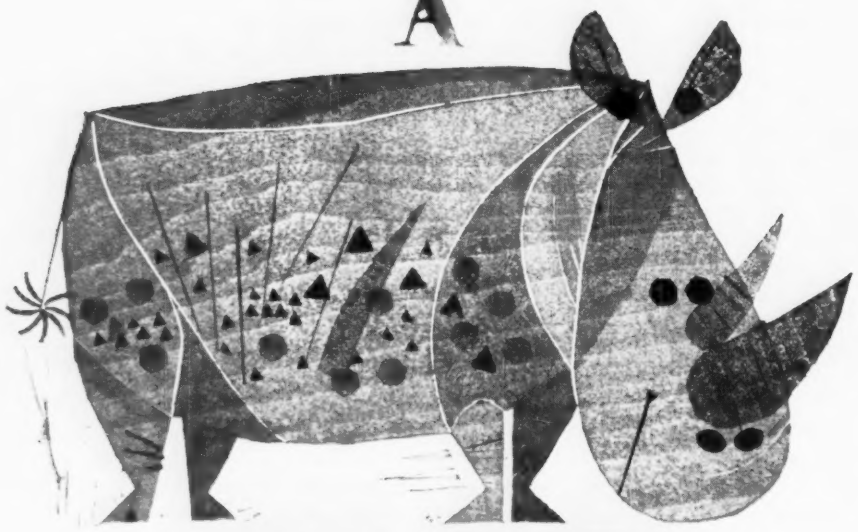

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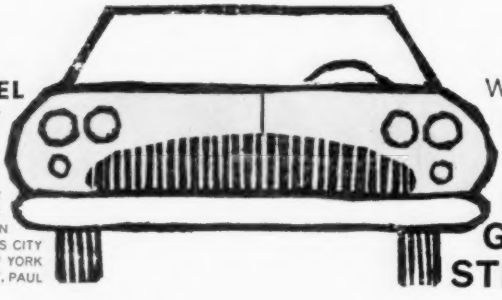

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President Kennedy has this mobilization authority already . . .

1. **Production Materials—he may establish priorities for defensework and allocate materials and facilities.**

2. **Personnel—he has the authority to assign members of the national defense executive reserve to government positions.**

3. **Production Facilities—government has authority for financing (direct loan or guarantee) defense production facilities. Many machine tool builders have accepted "M-Day pool orders" to be triggered by the Office of Emergency Planning.**

4. **Defense Contracts—While the Armed Forces Procurement Act specifies formal advertising of defensework, exceptions permit use of negotiated contracts to facilitate national defense.**

What Mobilization Would Mean to You

HOW WILL metalworking be affected if President Kennedy calls for partial mobilization?

Mobilization officials say the nation's industrial plant is in readiness, and the administration already has the necessary powers to make the transition smoothly. William C. Truppner, director, Office of Industrial Mobilization, Business & Defense Services Administration (BDSA), described the situation to STEEL:

BDSA broadly is responsible for production and materials resources for defense. It is the agency's job to be prepared to shift the economy to an emergency footing on a moment's notice. Its attention is directed to three areas:

1. Existing mobilization authority available to the President in this cold war period (see exhibit). 2. Preparation of plans for maintaining the flow of defense products during a limited war. 3. Preparation of plans for a nuclear war, including the postattack period.

Mr. Truppner's office administers the defense materials system (DMS) which provides priorities for defense, space, and atomic work. The system now operates in those areas and would be extended to nondefense work, if the President decided it necessary to maintain the civilian economy on an even keel. (A rush of rated defense orders could cause shortages of essential civilian goods.)

Mr. Truppner anticipates no problem in putting the system into effect because contractors have had experience with it since the Korean War. He concludes: "Our readiness posture is an excellent one," and added that there would be no wild scramble for materials under emergency conditions.

One reason the President did not have to declare a national emergency in his Berlin crisis speech: The economy is operating at a pace which can take increased defense demands without creating shortages.

• **Stockpiles**—Our $8 billion stockpile of critical materials is in good shape and doesn't require over-all expansion, say Capitol Hill sources. In fact, the Berlin crisis probably won't slow down what little disposal we've had the last year or so. (Reluctance of government officials to disturb the markets for stockpiled commodities has kept them from large disposal programs, although critics of the stockpile

claim we have too much investment tied up in it.) One example of items still being added to the stockpile: Jewel bearings, which are considered vital to advanced defense systems.

• **Machine Tools** — There is no problem in machine tools. Orders are ready to be issued by the Office of Civil & Defense Mobilization (soon to be renamed the Office of Emergency Planning and lose its civil defense operations to the Pentagon). Requirements would trigger production of almost 15,000 general purpose tools worth $237 million. Latest figures show that 82 machine tool builders have accepted such "M-Day pool orders," which can be triggered by telegram. The tools would be delivered to designated defense users within six months.

The government has about 88,000 machine tools that are ready to be put into action, and, in addition, some of the 150,000 tools owned by the military services may not be operating full time now. One possible result of the Berlin situation: Military officers in charge of declaring tools "excess" to their requirements may tend to hold off. OCDM expected about 20,000 tools to be "excess" in fiscal 1962.

One OCDM official emphasizes: There is absolutely no shortage of production equipment for limited war buildup.

If the situation becomes more serious, there will be cause for reinstituting the five year writeoff for defense facilities, or for providing additional borrowing authority for government loans for defense facilities.

• **Labor**—The Berlin situation has already had some effect on labor. It is reported that the Department of Labor is talking tough to unions contemplating strikes during this period, particularly those which might most directly affect a buildup in Europe.

The department conducts periodic meetings with OCDM on manpower supply. One official thinks that skilled labor will be available as fast as industry can build up its production.

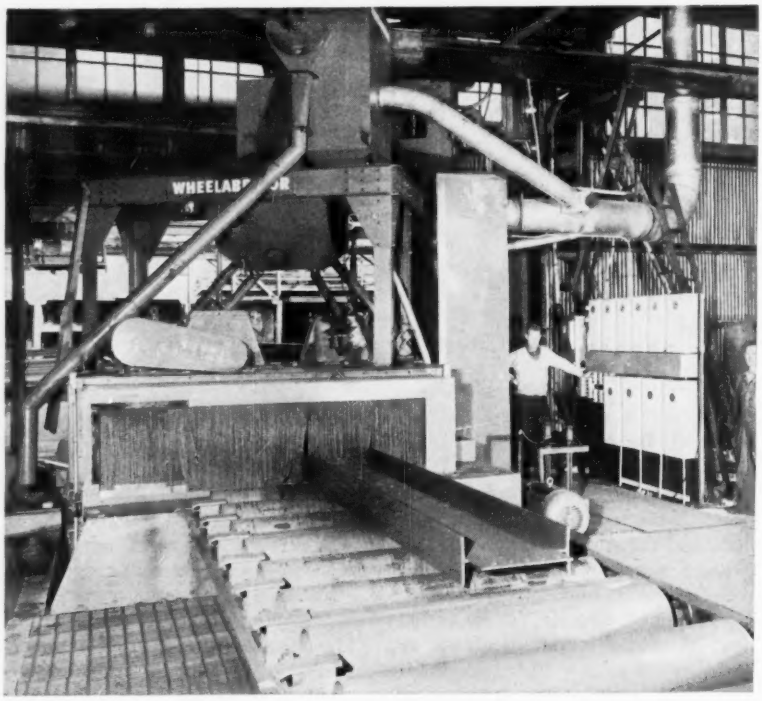
• **Controls** — Labor Secretary Arthur Goldberg assured STEEL there was no need for standby wage and price controls at this time.

• **Exports**—Another area to be affected by Berlin is our trade with the Communists. Shipments of even semistrategic materials to the Reds are certain to be heavily criticized by Congress and the public. One source suggested that the shipment of carbon steel to the USSR would be halted by public demand, if not by the Commerce Department. House Republicans are already speaking out.

Last week, the House Republican Policy Committee pointed out: 1. It took strong Congressional protests to prevent the export of machine tools to the USSR last spring. 2. Scrap metal shipments to Yugoslavia from Michigan hit 6250 tons in one week recently. Concludes the committee: "We must exercise extreme care to avoid helping to contribute to Soviet war capabilities."

Export controls involving non-Communist countries are conceivable if tension increases. One source close to the White House suggested that machine tool exports might be suspended once the industry's backlog approaches 18 months. But current backlogs of about four to five months make that day seem far off.

• **Exec Reserve**—The possibility of calling up any of the 3000 industrial executives who belong to the National Defense Executive Reserve is remote at this time. Upon the receipt of orders, they would move to predetermined locations to carry on the functions of government.



Structural Cleaning Halves Costs

STRUCTURAL cleaning costs were reduced 50 per cent with an airless, abrasive blast cleaning machine at Western Bridge & Steel Fabricators Ltd., Vancouver, B. C. Additional advantages include better welding preparation, plant housekeeping, layout, gas burning, tool life, and paint adhesion.

Four, high capacity, abrasive propelling units are used in the Wheelabrator cabinet (made by Wheelabrator Corp., Mishawaka, Ind.).

How Auto Stocks Are Shaping Up

AUTOMAKERS should have a five to six week stock of cars in dealers' hands when Big Three labor contracts expire on Aug. 31. About a third of them will be 1962 models. That inventory situation bolsters Detroit's belief that carbuilders are betting on a labor settlement without a strike.

They're trying to close down 1961 production, so there won't be a surplus of "last year's" cars when the 1962 selling season starts in September. General Motors Corp. and Ford Motor Co. dealers are already complaining that they're short on many styles, particularly the sporty compacts like Chevrolet's Monza and the Falcon Futura.

Only a few Ford lines are still in production. Everyone also is down for an early changeover. Startups on new models begin next week. Even so, August production is scheduled at less than 190,000 units. That still gives most divisions at least two weeks to debug assembly lines before contracts expire. They'll then be able to start up quickly if there should be a short strike in early September.

• **Low Inventories** — The outlook is for an inventory of 650,000 cars (including '62 models) at the end of next month. Stocks now stand close to 900,000. To reach the desired level, dealers will have to peddle about 15,300 cars daily during August. That should be easy. Even in the dog days of early July, the daily sales rate averaged 14,200. It ran at a near record 20,000 in June and has averaged about 17,700 this year.

If the labor contracts are signed by the deadline, dealers will start unveiling '62 models less than three weeks later. Detroit is chary about revealing introduction dates, but it looks like most Ford company lines, Chevrolet, Plymouth, Oldsmobile, Cadillac, and Studebaker are expected to appear between Sept. 15 and 26. The remaining makes will rush in during the next two weeks. By mid-October, all but a few of the specialty lines like Thunderbird will be before the public.

• **Fast Buildup** — Barring unforeseen trouble at the bargaining table, automakers are looking for a rapid buildup of '62s in the fourth quarter. *Ward's Automotive Reports* says tentative schedules call for 618,000 cars to be produced in October and suggests this level may be maintained through November and December too. If so, it would mean one of the boomingest last quarters since 1955 when 1.9 million units were produced.

With July - September output pegged at 1 million, 1961 calendar year production would reach 5.5 million cars (first half total was 2.7 million).

• **Better Year Ahead**—Detroit is starting to talk about a "better than 6 million" sales year in 1962. That will be a healthy improvement over this year's expected sales of 5.8 million autos, including imports.

Key Negotiators at GM Bargaining Table

Louis G. Seaton
Vice president-personnel
General Motors Corp.

Affable, "no nonsense" Lou Seaton has been active at the bargaining table for 25 years—all of it at General Motors. He started as a sign painter in 1928. He has been a vice president since 1957.

Active in charitable and civic affairs, 55-year-old Mr. Seaton is a native Detroiter and a graduate of Wayne State University. He's considered basically responsible for the cost of living and annual improvement concepts that GM instituted in auto bargaining in 1948. A major Seaton campaign is to convince hourly workers that fringe benefits are just as much a cost as direct wage increases.

Mr. Seaton deals with 21 international unions covering GM workers. He's a favorite with reporters, even though he once learned to say "no comment" in eight languages.

Leonard Woodcock
Vice president-director GM Dept.
United Auto Workers

Born in Providence, R. I., 50-year-old Leonard Woodcock spent his early childhood in England, moved to Detroit in 1926. He started working in the auto industry in 1933, and he has been active in labor work since that time. A UAW vice president since 1955, he is generally considered to be the heir apparent to Walter Reuther's post.

Know as a shrewd, articulate, and educated bargainer, Mr. Woodcock represents the "smooth" side of the modern labor movement. He is an elected member of the Wayne State University (Michigan) board of governors, is married, and has three children.

How to Trim

"TRANSPORTATION costs generally have more than doubled in the last decade," says Stanley H. Brewer, professor of transportation, University of Washington, Seattle. Industry plunks down an estimated $50 billion annually to move materials and goods to markets.

Everything from new packaging through better management control are among the tactics taken by shippers who work to slash costs.

• **The Gamut**—Joy Mfg. Co., Pittsburgh, has lowered its transportation costs from 4.1 per cent of the sales dollar in 1947 to 1.2 per cent. A. S. Robertson, general traffic manager at Joy, says transportation costs of machinery manufacturers, excluding electrical products, average 3.5 per cent of the sales dollar. To do better than the average firm, Joy gives special attention to consolidating shipments, conforms closely with freight classifications, moves exports to port in carload lots, and takes advantage of through rates on common carriers. Outbound freight shipment costs were reduced 0.0007 cent a pound in 1960 vs. 1959. Based on total weight shipped, the saving amounted to a healthy $43,415.

• **Packaging Benefits**—By replacing wooden kegs with corrugated boxes for nut shipments, Industrial Nut Corp., Sandusky, Ohio, cut costs six ways. Here's how Hinde & Dauch, Sandusky Div., West Virginia Pulp & Paper Co., cites the savings: 1. The basic package cost is less. 2. A box weighs 4¼ lb less than a keg. 3. 3500 boxes fit in space required for 800 kegs. 4. A box is filled in 10 seconds; a keg took 1 minute. 5. A box holds 25 per cent more nuts. 6. One man with a fork lift truck handles 3500 boxes in 20 minutes; four men handled 800 kegs in 30 minutes.

"There's an additional payoff in the box concept," says S. J. Cole, sales manager for Industrial Nut. "We have the boxes printed with our customers' names on them. They use them for shipping parts to their dealers. Savings to Industrial Nut's

TIPS FOR SHIPPERS

- Start with the right container.
- Consolidate shipments when possible.
- Conform with freight classifications.
- Observe carrier regulations.
- Obtain ideas from customers, suppliers.
- Check tariff structures.
- Select the best route and carrier.
- Identify shipments with documents.
- Inspect damage claims and reports.

Your Shipping Costs

customers amount to $2000-$3000 a month."

• **Preshipment Test**—Black & Decker Mfg. Co., Towson, Md., operates its own preshipment laboratory for testing packaged products. In about 75 minutes, the laboratory equipment can simulate 1000 miles of normal transportation. Previous methods took two weeks. Testing of a carton for a utility hedge trimmer showed the product was overpackaged when a 200 lb test board was used. A second sample, with 125 lb test board, was found O.K. The change meant a saving of 8 cents per package.

Westinghouse Electric Corp.'s Lamp Div. in Bloomfield, N. J., has introduced palletized shipments for 19 varieties of fluorescent lamps for industrial and commercial fields. Previously, the lamps were available only in 6, 12, and 24 lamp cartons. Now customers purchasing 300 or more lamps can request palletized shipments. There is no extra charge for the expendable pallets; the palletized shipments save as much as 30 per cent in warehouse space; lamps are stacked glass to glass, eliminating extra packing material. For example, an order of 1000 F40 lamps would normally contain 2000 separate pieces of packing material vs. 45 pieces for palletized loads.

• **Chats Pay**—"Traffic men for both venders and buyers should get together periodically to discuss mutual problems and alternative methods of shipping," says R. M. Stadick, general traffic manager, Electric Storage Battery Co., Philadelphia. Here's the result of a talk. One of Electric Storage's suppliers in the Midwest was shipping goods to Atlanta. The area is covered by two tariff bureaus, with carriers divided between the two. On one commodity, the rate differential between the two bureaus amounted to 62 cents per hundredweight. By talking about which carrier to use, instead of following an established pattern, Electric Storage saved $175 on each shipment.

In another instance, a Vermont vender shipped light, but bulky, articles on trucks. Each load weighed 8000 lb, yet Electric Storage was charged for 24,000 lb—as Mr. Stadick puts it: "16,000 lb of air." Mr. Stadick investigated, found the rate broke at 6000 lb for a-less-than-truck-load rate, and subsequent shipments were made in not more than 6000 lb lots. Cost cut: $175 per load.

• **Retain Identity**—"If a high value is involved and time factors are critical, make sure your shipment can be identified and located readily," says Karl Gresham, president, A. W. Fenton Co. Inc., Cleveland. The head of the international freight forwarding firm says carriers can trace shipments in jig time, using the numbers on conveyances and manifests. Companies often want to know if they should re-order goods that seem to have strayed. If the original shipment can be found, the re-order may not be necessary.

• **Inspect Damage**—Hinde & Dauch recommends that you take steps to correct damage. If it occurs in transit, try to determine why. Have salesmen inspect damage claims and make complete reports. Ask receivers to analyze the damage and take pictures, if possible, that reveal causes. Also, get the damaged container. It may be inadequate for the job, call for redesign or shipping procedure changes.

Nearly every carrier has a freight claims prevention agent or team. Check with them when you have a touchy shipment coming up. Men like A. W. Peterson, manager of station service and freight claims prevention for the C&O Railroad, constantly study and supervise loading methods. In one case, the C&O team suggested using an inflatable rubber sack, 4 x 8 ft, between stacks of high quality tile building blocks. The "balloon" cushioned the blocks against damage.

• **Seaway Savings** — "We used to ship overland to New York, then to Europe by water," discloses Russell Taccone, president, Taccone Corp., North East, Pa. "That meant an additional handling operation in Gotham. Now we truck components for our molding machines right to dockside in Erie, Pa., and oversee the loading procedure. Our inland freight rates are reduced as much as two-thirds, our personal supervision radically pares freight damage, and we can give more accurate delivery promises."

• **Scales Steal**—N. E. Cousineau, president, Ohio Counting Scales Inc., Cleveland, recommends daily checks by operators for proper balance and order in company scales. He also suggests testing scales every 30 days for calibration and performance. He relates this sad experience of a Cleveland fastener maker who didn't have checks on his balances. The firm shipped its products in 100 lb kegs. Unknowingly, each lot was weighed on a scale that was 1 ounce in error. Compounded 100 times a day during a year, that error cost the company $2500 in lost profits.

• **Other Cost Cutters**—There are innumerable ways to trim costs and save time in shipping. Taxicabs in Cleveland will deliver 50 lb packages at meter rates; saving paperwork, handling, and messenger charges . . . Greyhound Corp., Chicago, offers nationwide package express service via buses to more than 25,000 cities and towns. It features 24 hour a day, seven day a week service, with same day or overnight delivery within a radius of 500 miles . . . REA Express is experimenting with rates based on the number of pieces shipped and total cubic volume, rather than the usual weight times distance charge. The company also offers shipper-loaded container service at a flat "per container" rate instead of a weight charge . . . Bliss & Laughlin Inc., Chicago, is profiting from using a newly designed flatcar for shipping cold finished steel bars in special cradles. It replaces boxcars, eliminates bracing and blocking, and facilitates loading and unloading . . . Check the advantages of air freight. On Sept 1, 18 North Atlantic carriers of the International Air Transport Association will introduce a new volume rate structure on transatlantic shipments which will save shippers up to 63 per cent over previous general commodity rates.

Tying Managers' Role to Profits

The contribution is the only real measurement of managerial efficiency, says steel fabricator Leslie Berry

EARLY in 1959, Leslie Berry, president of Southern Engineering Co., steel fabricating firm in Charlotte, N. C., gave this disquieting news to his managers: "Profits are virtually nonexistent. Things can only get worse unless management efficiency is radically improved."

Needed was a sweeping reorganization of executive responsibilities, goals, authority, and communications. "Our objective was to tie down each manager's role and contribution to the prime corporate function—making a profit," points out Mr. Berry.

The payoff: Net profits (before taxes) improved from less than 2 per cent in 1959 to 5.12 per cent in 1960.

Calling in a management consultant, Profit Counselors Inc., New York, to help, here's how Southern Engineering boosted its profits while the rest of the industry's earnings were slumping.

Basic Problems

• **"Functional Vacuums"** — Managers were either living so close to their jobs they suffered from "localism" or else they built "ivory towers" not only for themselves but for their departmental managers. Says Mr. Berry: "Functional vacuums can create havoc. The absence of communications and co-ordination in the sales division, for example, resulted in its efforts not being properly geared to the productive capacities of our plants. That affected the profitability of our overall operation because we had to contend with resulting poor plant utilization, lack of planning of production requirements (including tools and plant layouts), and excessively high direct and indirect labor costs because of poor utilization of labor."

Many managers didn't or couldn't realize that the freewheeling, high profit days were gone. For example, one report showed sales rising 100 per cent in the previous ten years. The fact: While true in dollar volume, sales tonnagewise were up only 13 per cent in the period.

• **Faulty Communications** — Too often specific duties weren't pinpointed. Lack of information exchanged between departments made inventory control haphazard; financial planning difficult.

Action Taken

• **Key Organization Changes**—The executive vice president spot was eliminated and Mr. Berry took over full operation of the company. His philosophy: "The smaller company in its attempt to emulate the successful big company too often succumbs to 'vice presidentitis.' Too often it's just that—a vice! Setting up too many organization buffers between the top man and operations affects management efficiency and profits in that order."

• **Budgetary Controls**—Administrative, sales, and production departments were put on strict budgets. Now, all expenditures are forecast monthly and yearly. That makes department and executive performance appraisal possible on a periodic basis, says Mr. Berry.

• **Management Reports** — Monthly

reports on budget variances (where sales and production figures as well as expenditures are shown in relation to budgeted goals) are issued to key managers. They serve as operating performance guides.

• **Pepped Up Communications**—Weekly meetings are held to improve co-ordination and communications between department heads. Monthly, all operating managers meet to analyze job costs for the preceding month.

• **Market Study**—A comprehensive analysis of industry and company prospects cut down "localism" in management thinking, paved the way for new ideas on diversification. As a result, the company is branching out into new areas (and cutting back in some old, low profit ones); it's retaining its younger managers who now see quicker chance for advancement. Some of the directions diversification and retrenchment have taken:

• The study showed structural steel used in new construction was declining at a steady rate while the use of reinforcing steel was rising. Result: Southern set up a subsidiary, Carolina Rebar Co., to take advantage of the trend its market study forecast. Already the division has become a major contributor to profits.

• Southern Erectors, a wholly owned construction subsidiary that had nearly foundered, was revitalized after it was shown that the market and the knowhow needed to make it an added profit contributor were available. "It just needed management attention," says Mr. Berry.

• Analysis of regional competition showed it had almost doubled in a ten year period and that the capacity of the fabricating facilities in the prior three years had actually exceeded market demand. Result: Unprofitable job bidding. Says Mr. Berry: "We found we had been concentrating on high tonnage jobs involving few manhours. These were easy but marginal profit jobs. A switch in our sales planning has resulted in more profitable job bidding."

• Cut more than $100,000 ($70,000 the first year) from its costs by adopting a methods improvement program recommended by the consulting firm. Involved was a realignment of plant layout and new material handling system and equipment. Says Mr. Berry: "This fat trimming effort by all of us in 1959 put us financially—and even more important, psychologically—in gear for our showdown profit performance in 1960."

• Southern de-emphasized its warehousing operation, a profitable item in past years. A study showed that to meet the competition of "captive" warehouses set up in recent years, a large capital investment would have to be made. "We felt we should not expend either capital or energy in this secondary market," says Mr. Berry.

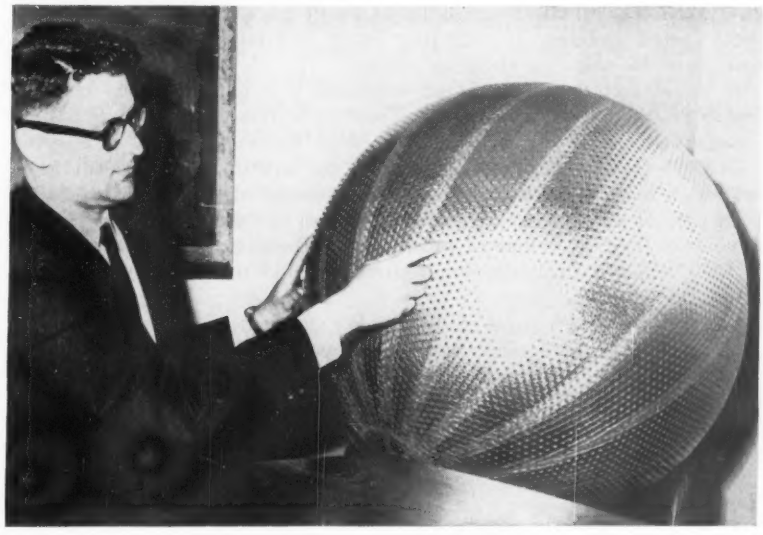
Sums up Mr. Berry: "Our industry is suffering from the shocks of its own evolutionary nature. As steel replaced lumber as the prime building material, some other material, perhaps not yet known, may well replace it. There is still a lumber industry and there will, of course, always be a market for steel. It's up to us, as managers, to make sure we don't get hurt in the shifting sands of an industry settling in place."

How Fast Should Ranks of Scientists Grow by 1970?

THE NATIONAL Science Foundation predicts the total labor force of the U. S. will be 87 million in 1970, compared with 73.6 million today. We'll need about 2.5 million professional scientists and engineers then (vs. 1.4 million working today).

Of today's supply, 87,000 hold doctor degrees. In 1970, we'll need 168,000, says NSF.

While the labor force is increasing at an annual rate of 1.4 per cent, NSF concludes the ranks of professional scientists and engineers must grow at a rate of 6 per cent a year and the doctorate population at a rate of 7 per cent a year.



Foil and Plastic Cut Satellite Weight

AN INFLATABLE satellite model was fabricated from a new Alcoa foil and plastic laminate developed by G. T. Schjeldahl Co., Northfield, Minn. Chemically milled openings in thin foil provide additional weight reduction but retain the structural rigidity of the foil. The new material will be used in huge orbiting balloons for the National Aeronautics & Space Administration's communications satellite program.

These Tax Hikes Deemed Necessary to Help Offset Revenue Loss from Capital Spending Incentives

Tax Proposal	Estimated Revenue Gain
● Taxes on foreign income	$ 35 million
● Dividends, interest withholding tax provision	$532 million
● Entertainment deduction restrictions	$150 million
● Treating gains from sale of depreciable property as ordinary income	$125 million
● Taxes on co-ops, mutual fire & casualty insurance firms	$ 55 million

PROPONENTS of the 8 per cent tax credit plan to boost capital spending (STEEL, July 24, p. 53) have good cause for worrying about its survival.

It would cost the Treasury an estimated $1.1 billion to $1.2 billion in lost revenues. Treasury Secretary Douglas Dillon has warned that President Kennedy will veto any bill which doesn't contain tax boosting provisions to help offset the loss. The proposed tax hikes listed above are considered necessary — they would still leave an estimated net loss of $200 million to $300 million, which the administration would tolerate at present.

But proponents see these storm clouds gathering:

1. The Berlin crisis could force an increase in defense spending which would make the President reluctant to sign a tax bill involving revenue losses.

2. The biggest single source of new revenue suggested is the provision for withholding 16.67 per cent on dividends and interest. The proposal has opposition from "widows living on their dividends to stockbrokers," and the political hurdles will be tough to overcome.

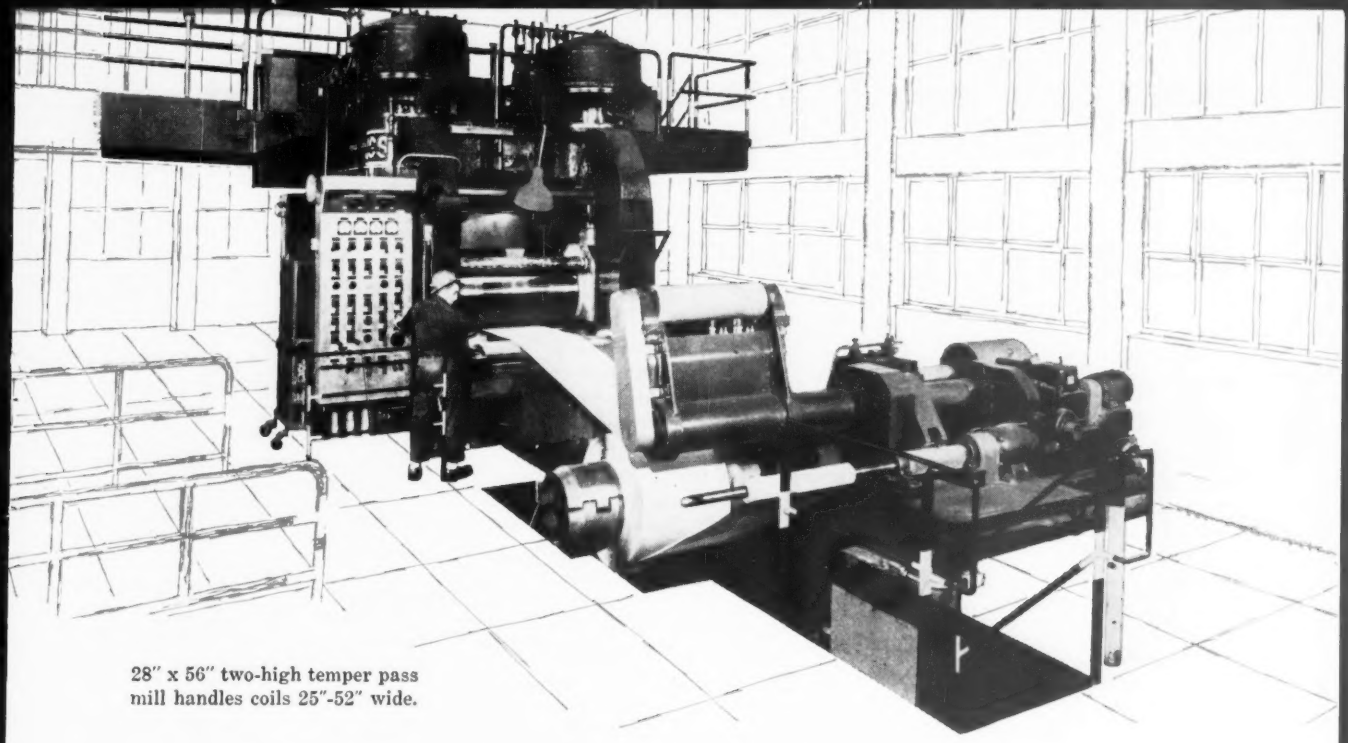
3. Other proposals to hike revenue will come under fire too, including the tax on co-operatives—a strong special interest group to many legislators.

● **NEW TAX BILL** — It now appears that the "$100,000 floor" will refer to tax liability, not spending, and that the credit will be applied in the year that the investment becomes part of the depreciation base, not the year in which the spending occurs. The floor provision is designed as a special incentive to small business. Thus, according to reliable sources, final language will have the 8 per cent tax credit apply to new equipment and up to $50,000 worth of used equipment with a life of six years. A credit of up to 50 per cent of the taxpayer's liability in one year will be allowed. That limitation won't apply to the first $100,000 of tax liability.

Three provisions will affect industry the most on the other side of the ledger. No business expense deductions will be allowed for club dues and fees and business gifts exceeding $25 per year, and travel expenses will be limited to a "reasonable" amount, to be determined by the Internal Revenue Service. The Treasury hopes to gain $150 million in revenue this way.

The Treasury will also gain $125 million a year by treating the gain from the sale of personal property as ordinary income to the extent of depreciation taken. To the extent the gain exceeded the cost of the property, it would be taxed as a capital gain.

A modest $35 million in revenue will go to the Treasury from changes in foreign income taxes. Reacting to U. S. business interests abroad, the House Ways & Means Committee decided to put off until next year any Treasury program to tax foreign subsidiaries of U. S. companies at the 52 per cent corporate rate. The committee has decided to tighten tax standards of Americans living abroad by putting a limitation on the total tax exemption now granted. The exact ceiling hasn't been set.



28" x 56" two-high temper pass mill handles coils 25"-52" wide.

Now 2 new Bliss mills help keep tempers under control at Gary Sheet & Tin

Until last summer, Gary Sheet & Tin tempered "stainless" on the temper mills used for carbon steel. Then to add a new dimension of efficiency, the plant decided to set up separate facilities for stainless and installed a new Bliss temper pass mill to handle it.

Product of Gary and Bliss thinking, the mill takes coils as wide as 52", as narrow as 25"; tempers gages from .008-.150" to an average hardness of 83 Rockwell. Result: this plant of U.S. Steel is now more able to take heavy workloads and special orders in stride.

Another Bliss temper mill is paying similar dividends in Gary's continuous pickling line. Key addition of an April '59 expansion program, this 34" x 76" two-high mill with husky entry and delivery bridles enables Gary to handle strip 18"-62" wide, in thicknesses from .059"-.187". It reduces stock 1½-2%, serving to fracture the scale, thus resulting in less pickle liquor required and higher pickling rate.

Can a custom-designed Bliss mill help you solve a profit-robbing problem? See how the Rolling Mill Division has assisted other plants. Write today for our 84-page Bulletin 40-B.

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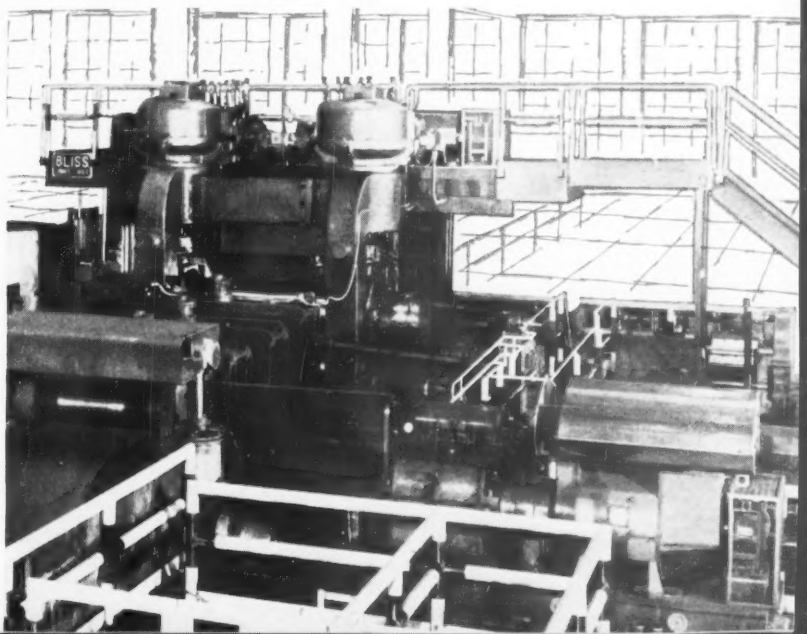


34" x 76" two-high mill in Gary's continuous pickling line descales and tempers at the same time.

U. S. Trade Missions Report

Germany: Undersold

"THE INTEREST of German importers in many U. S. products is outrunning the interest of U. S. manufacturers in supplying them," asserts Charles B. Stebbins, Commerce Department official who headed the U. S. trade mission to West Germany.

That observation is substantiated by other members of the mission. Says Richard J. Blum, vice president of New York's Saks & Co.: "The market for consumer goods in Germany is limited only by the U. S. manufacturer's skill in going after the market." Adds William E. Rutz, executive vice president, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.: "We need more aggressive sales promotion in the German market."

• **How U. S. Fails**—The trade mission drew up this list of U. S. sins that impede our exports to West Germany: 1. Our failure to reply to their correspondence. 2. Our failure to prepare correspondence, operating instructions, packaging, and promotional material in German. 3. Our indifference to the special needs, tastes, preferences, practices, and psychology of the German market. 4. Our failure to quote c.i.f. (cost, insurance, and freight) German ports. 5. Our failure to exploit German trade fairs. 6. Our failure to appoint aggressive agents and offer reliable sales and service. 7. Our credit terms that are stiffer than competitors' in other countries. 8. Our failure to keep informed on market prospects, business conditions, competition, and other factors bearing on successful sales in Germany. 9. Misconceptions on the part of German buyers concerning prices, quality, and workmanship of U. S. merchandise and lack of information about new U. S. products, methods, and technology.

• **What They'll Buy**—"It is quite clear that the opportunities for expanded U. S. trade with Germany, especially exports, are excellent," the mission reports. William F. McClelland, director, corporate market planning, International Business Machines Corp., lists these U. S. products "of particular interest" to German businessmen: Precision measuring and testing equipment of all kinds, radio and TV repair equipment, automatic recording and quality control equipment, material handling equipment, small office-machines, numerically controlled machine tools and other automatic machine controls, automatic form handling equipment, vending machines and coffeemakers, automatic steel mill machinery, wire drawing equipment, and foundry equipment.

Mr. Rutz lists these items as having "strong export possibilities": Machine tools, small metal cutting tools, steel in rolls, flat, and bars, road building and excavating equipment adapted to meet European conditions; plastic materials; metalworking supplies (such as fasteners) in metric sizes; water softening devices, valves and fittings, and equipment for servicing autos and farm equipment. Other items mentioned: Camping equipment, auto accessories, household labor saving devices.

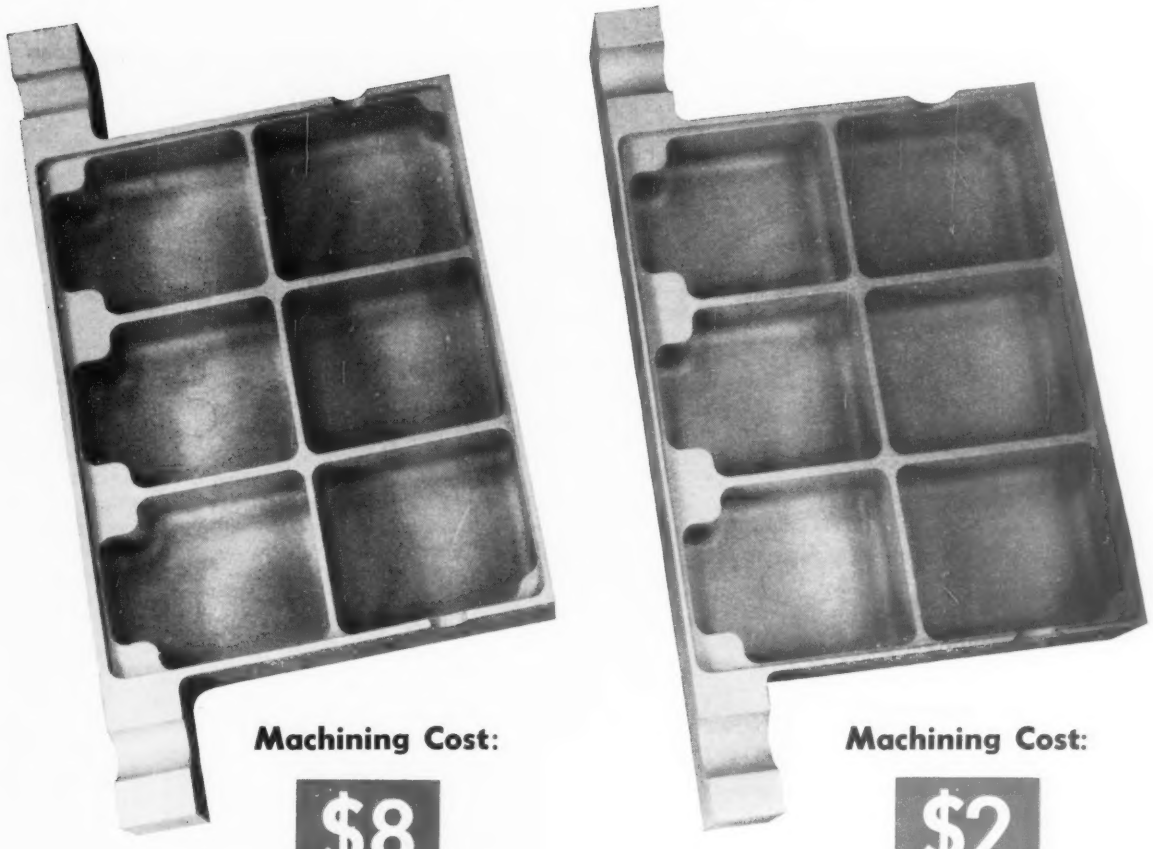
Finland: Underestimated

"FINLAND WILL IMPORT nearly $200 million worth of industrial machinery during the next five years—about half will be machine tools." So asserts William H. Drisko, president, Stone Co., Minneapolis, a member of the U. S. trade mission to Finland.

He says U. S. firms can get more than half of that business if they simply pay the same amount of attention to potential customers there as to those in the U. S. "We don't have to compete pricewise with machinery makers in some other countries. Many Finnish executives are perfectly willing to pay a 25 to 30 per cent premium for U. S. machine tools of the latest design," he asserts. But he adds that the U. S. firm must be willing to grant credit "without a Congressional investigation," must train Finns to sell U. S. machinery, and must do a more effective job of explaining the merits of their equipment. STEEL will present full information on the growing machine tool market in Finland in "Machine Topics" Aug. 7.

Finland has liberal tariffs and no quotas on industrial machinery. The country has eight large metalworking plants (employing 2000 to 4000 each) and 11 shipyards. It also has about 100 small metalworking plants. To be built: An integrated steel mill with a capacity of 350,000 ingot tons. To be equipped: A copper rolling facility. To buy equipment: Three new iron ore mines, the first now being developed.

• **Misunderstood Market**—Charles L. Rumrill, president, Rumrill Co., Rochester, N. Y., calls Finland a "misunderstood market." For example, some Americans think the nation is in sympathy with Russia. Though Finland shares 800 miles of border with the USSR, the little nation faces the West. It has long traditions of civil government, finance, and education. Students are required to learn three languages—Finnish, Swedish, and an elective. For the elective, almost 90 per cent take English.



This is an example of how to . . .

Design for Profit Growth

A GOOD DESIGN ENGINEER is a man who can do for $1 what any fool can do for $2.

We're talking about the design engineer who applies a usable idea, so it can be converted into a product that's sold at a profit. He's the link between ideas and hardware. We're not talking about the stylist who is also called an industrial designer.

Some 250,000 people function as design engineers in the U. S. today. They may bear one of 50 or more titles, but they all design and develop products. Their numbers have quadrupled since 1950. Editor Colin Carmichael of *Machine Design* estimates that twice as many, or 500,000, will be needed by 1966.

How can you as a manager create the climate and give the assistance needed to stimulate more $1 jobs?

You need to lower or remove three principal hurdles that inhibit good design engineering:

1. The pace of technological change trips some designers and has enlarged and altered the design function.

2. Management too often treats design engineers like bush leaguers.

3. Some design engineers act like bush leaguers by failing to keep up with technical advances.

Changing Design Function

A design engineer's first task is usually to decide how motion will be accomplished and controlled. Classically, many of the functions

For profitable design . . . CONSIDER

HOW MUCH EFFECT does design have on your profits? Production people contend that many of their problems could be avoided by better design. R. R. Miller, president of Precision Metalsmiths, Cleveland, puts it this way: "Costs, quality, and delivery are designed into parts before we cast them." Time and again, STEEL editors get this answer to the question: "Do your thinking in the design stage, planning on the material, the process, the finish and the delivery that you require. Pencil mistakes are easier to correct than metal mistakes."

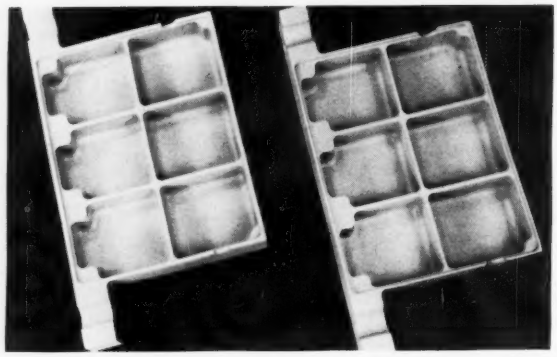
If you believe that "no one has ever made a good part from a bad design," how do you go about it? One recurring theme runs through all recommendations—check with the manufacturing people before the design is frozen. Overdesign means the part is expensive—but underdesign is costly when service problems crop up. The designer is the final arbiter for tolerances on dimensions, but he may be able to drop dollars out of costs by wider allowances in noncritical areas.

He'll need to ask these questions:

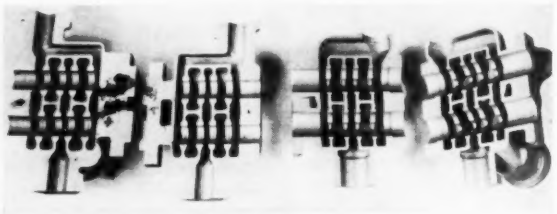
What will the product do?
When and where will it be used?
Who will use it and why?
How much will they pay for it?
What will it be made of?
What processes will be used to make it?
How big and strong must it be?
What work and efficiency must it achieve?
How much power will it need?

That sounds like a job for a superman. It would be, if the designer were to know all the details of all materials and processes. But he doesn't need to know; he can ask plant people, material suppliers, outside venders. In some cases, reference books can help, but beware! In fast changing areas of technology, the books may be partially out of date by the time they're printed.

Here are some examples of good and bad design practices, showing the evolution of improvements. They are taken from the casting field, but similar case studies can be prepared in any area.



The electrical equipment housing is for a commercial job. Originally, considerable machining had been done on the outer surfaces, and the hole areas on the ears had been drilled and reamed. The hole through the thin wall had been chamfered after sizing. With the changes suggested by the supplier, machining costs will drop about $6 from the original (more than $8) price. It's done by using cast surfaces, thinner walls, casting the holes closer to size, and casting the chamfer in place.



The original version of this hydraulic valve body left considerable metal to be machined. So much, in fact, that shrinkage porosity could occur. The redesign cut out much of this metal, took advantage of the close tolerances possible in the investment shell process to eliminate all but final machining steps. The new design saves money, is lighter, cuts machining time—and eliminates the shrinkage problem that caused high reject rates on x-ray inspection.

---

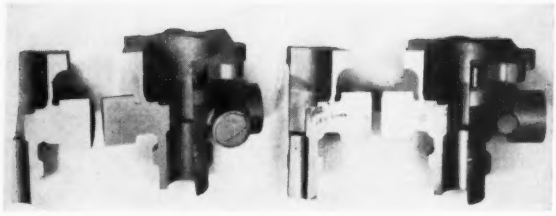
were done mechanically. Now electronics is taking over and bringing new problems. Management needs to recognize the evolution and find people with skills never before associated with design in industry.

No longer is a man competent if he can only design shafts, drives, and the other traditional means of accomplishing and controlling motion. Now he needs to know about electronics, nucleonics, and other arcane subjects.

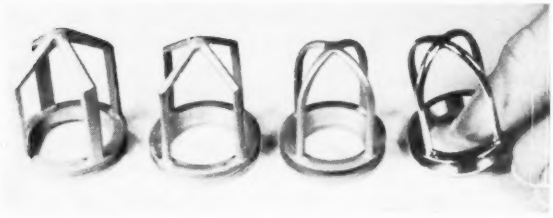
We're operating increasingly in design engineering with specialists working under the supervision of a project engineer. He has the broad, general knowledge. Experts suggest that specialists be available to more than one project engineer to give greater flexibility and efficiency to the organization.

George Fried of the corporate engineering staff (Stamford, Conn.) of American Machine & Foundry Co., advises building a convertible engineering organization that can be shifted to meet the changing needs of projects, particularly the big ones.

The design engineer's workload alone creates formidable barriers to good performance. *Machine Design* reports that 71 per cent of the metalworking companies replying to a survey had a completely new prod-



Making the part lighter may be a mistake. It worked for the hydraulic valve, was the wrong way to go for this part. Here, the heavy boss on the side permitted good feeding in the other heavy section. When it was reduced, shrinkage porosity developed. If the smaller boss has other design advantages, changes in gating practice may eliminate the porosity; the price is more complexity in the casting process, and that will reflect in dollars and cents to the user.



The cage shown is part of an artificial mitral (heart) valve. Evolution of the design for lighter weight and smoother contours is apparent. In the cage, in the finished valve, is a silicone rubber ball. A plastic fabric around the valve seat permits anchoring the valve in position. First person to have the artificial valve installed was Philip Amundson, Spokane. (Photo at right.) By an operation performed in 1960, the valve replaced a mitral valve irreparably damaged as an aftermath of rheumatic fever. The valve was developed by H. Lowell Edwards, Portland, Oreg., and Dr. Albert Starr, assistant professor of surgery at the Oregon Medical School, Portland.

Says Mr. Miller, "There isn't a 'universal design' appropriate or economically suitable for all metal fabricating processes." His suggestions to those considering precision casting apply to other fields of design. Here they are:

- **By design, you can eliminate excess weight and reduce rejects. In the preliminary stages, show the functional areas on the print and let the fabricator consider them on the basis of value analysis.**
- **Review quality standards. Eliminate "overengineered" specifications.**
- **Be realistic about dimensional tolerances; either "too tight" or "too loose" can cause extra costs.**
- **Purchase good tooling. It can save production manhours.**
- **Relate design to the method of production. Don't request a foundry to quote from a print designed for a weldment—or vice versa.**
- **Know the standards for processes and materials. One source: Technical societies. Change is rapid. What's being done today may surprise you.**
- **Use prototypes to check out design, functions and costs before final tooling for production.**
- **When picking a material, consider the use to be made of the product, but don't forget to relate the material to the production process.**

Visit the production area. See how other parts are being made, talk to suppliers and ask for ideas.

It takes thought, planning, knowledge, and work to design for profit growth. And in our changing technology, no specification can be considered final.

uct in some stage of development during 1960; 66.5 per cent so reported in 1959. And 74.3 per cent expect to make changes in standard products this year vs. 74.7 per cent in 1960 and 69 per cent in 1959.

Managing the Designers

Besides recognizing and preparing for the profound changes going on in the design engineering

function, your job as a manager is to provide leadership for the designers.

You can do the basic things of providing fair salary administration, adequate status, good working conditions, and guidance on management's cost goals. But you need to do still more.

Dr. Philip Marvin, manager of American Management Association's Research & Development Division, suggests in *Machine Design* that you should be able to answer "yes" to each of these questions:

1. Can effective design engineering decisions be made?

Engineers must be positioned in such a way that they can make effective decisions. They must have the essential information at their disposal, the capacity to use the information, and enough time to make the decision.

2. Are operating areas specialized?

Do jobs overlap? Are responsibilities clearly defined? Do designers understand their jobs?

3. Has authority to act been granted?

Pinpoint individuals who have the power to act. For each, list the activities he can initiate. Determine the degree to which his authority coincides with the decisions he makes. The two should always match.

4. Are reporting relationships effective?

You don't lose control by delegating authority—if you clearly define reporting relationships and offer advice and guidance only when it's needed.

5. Are workloads uniform?

Light loads are as bad as excessive ones.

6. Is equilibrium established?

Once you set your design engineering pattern, departures for special situations should be clearly recognized as temporary.

7. Can changes be made easily?

A "yes" to No. 6 and 7 is not inconsistent. When new conditions arise, your organizational setup must meet them, whereupon a new equilibrium can be established.

8. Can expansion take place?

This question relates to the previous two. A common problem with an expanding company is that design engineering hampers growth. The situation arises partly because of the shortage in some design specialities and in good design generalists, and it also results from the methodical and perfectionist traits inherent in many engineers.

9. Is complexity minimized?

Keep organizations as simple as possible. Complexity usually develops from failure to renovate organizations in adjusting to new conditions.

10. Is staffing adequate?

This question is already partly answered if the first nine have been studied. Enough technicians should be on the staff to handle the subprofessional work.

What personality traits does the normal engineer have? Eugene Raudsepp, director of psychological research with Deutsch & Shea Inc., New York, reports in *Machine Design* that the engineer rates high in cautiousness and perfectionism. He ranks high in work enthusiasm, conformity, professional ambition, and the ability to work under pressure. He is moderately self-confident, ingenious, and imaginative. He is low in sensitivity to people and in persuasiveness, communication skills, tact, synthesizing and decision making abilities. He is very low in diplomacy, introspectiveness, and in his tolerance for the intangible.

Mr. Raudsepp believes you'll do a better job of managing the design function if you take these engineer wants into account:

1. Programing and scheduling of his work assignments, clear objectives, and detailed planning.
2. A set, but not routine, pattern to follow.
3. Competent supervisors.
4. Adequate credit in the form of compensation, status, and security from his company for his ideas and accomplishments.
5. Opportunity to influence work and follow through on technical projects he has started.
6. Participation in decisions which affect him.
7. Freedom to maintain an independent attitude on how to tackle any problem.
8. Challenging and varied work assignments.
9. Information on how his work fits into the entire project.
10. Adequate aid and facilities to get the job done.
11. Clearly defined authority and responsibility.
12. Employment in a company that is known for its excellent products and reputable professional staff.

Improving the Designer

This should be a do-it-yourself project, but the encouragement must come from you as a manager.

Many companies find they give impetus to self-improvement when they allow the reading of technical publications on company time, pay the dues in technical societies, and grant total or partial refunds on the tuition for educational programs. Tuition refunds can:

- Lead to an advanced degree through accredited courses.
- Stress fundamentals rather than company centered specifics.
- Stimulate crossfertilization of ideas with engineers from other companies.

Keystone

Although he's one of the most anonymous performers in industry's ranks, the design engineer holds the key to your costs and thus to your profit growth. His increasingly difficult task needs your co-ordination and enlightened supervision.

Here are some criteria of a well designed job:

1. It performs its function with sufficient reliability.
2. It gives adequate life.
3. It can be produced in the right quantity and at the right price.
4. It has customer appeal.

American Machine & Foundry Co. is fond of saying its products are "better—by design." The concept of intention and purpose is the key to the design engineering function.

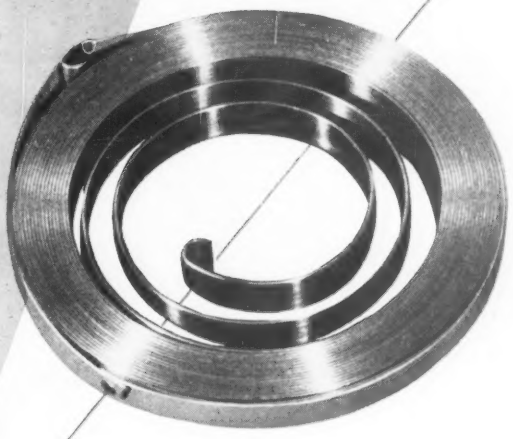
PLAN FOR PROFIT GROWTH

Reliability and Profit Growth

On Aug. 14, STEEL will show why reliability is vital to all metalworking, not just the missilemaker. We'll demonstrate how to achieve more dependability. For a free copy of any or all articles in this series (appearing biweekly since Jan. 16), write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

SANDVIK 11R51 STAINLESS STEEL

A Proven Solution To These Spring Problems



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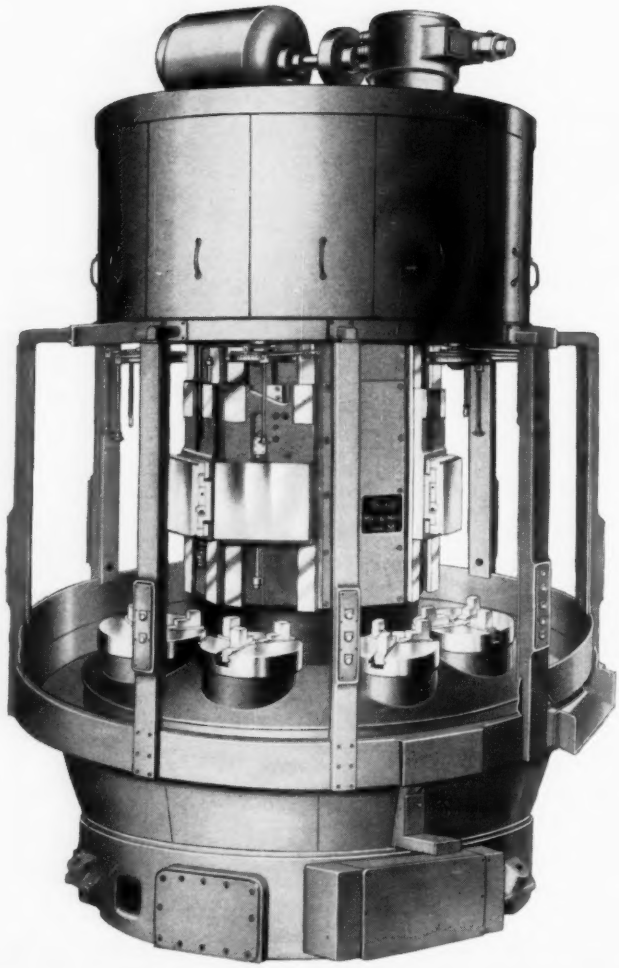

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Bridgeport 9, Connecticut

Autodom's Challenges in the '60s—No. 3

Manufacturing executives seek . . .

More Flexibility at Less Cost

Increase flexibility . . .

BECAUSE present mass production methods and techniques are generally tailored to handle high volume manufacture of parts, the most challenging manufacturing problem is to provide sufficient flexibility in production to meet the ever increasing customer demand for wide product variety and selectivity. Such flexibility must be accomplished with reduced cycle time from product concept to manufacturing, and with over-all product cost and quality maintained at the levels necessary to meet world-wide competition.

Flexibility is needed because of the continued uncertainty in customer product preferences since World War II and the current challenge by foreign automobile companies with efficient manufacturing facilities to fulfill the consumer demands.

To help solve the problem, we must develop greater depth and coordination in management for the necessary planning and action. We must emphasize programs to determine more precisely the anticipated customer product demand requirements at an earlier date so that more time is available for planning manufacturing flexibility.

Finally, we must concentrate our attention and effort to the initial planning of processes with backing from research and development groups within and outside the company so that the latest technological advancements can be employed.

PETER H. PONTA
Director-manufacturing staff
Ford Motor Co.

Boost productivity . . .

THE MANUFACTURING challenge during this decade will focus on increased productivity.

Studies indicate that although the nation's available work force will increase substantially in this decade, it will be a smaller part of the total population. The number of dependent persons will increase faster than the number employed. The shift in population balance means each worker will have to produce more to support a greater number of dependents.

To combat the imbalance, manufacturers will have to maintain high production levels through increased productivity and advanced technological development. Sensible use of automation, coupled with maximum effective use of our available labor force, are the cornerstones upon which we must build our manufacturing goals. While many persons view automated processes as a detriment to our economic health, they will be a key factor to our survival before the 1970s.

The kind of employees available for manufacturing will change during the 1960s. Studies show that the most desirable group, males 25 to 44 years of age, will decline. The new workers will come largely from the very young, women, and part time employees. The need for flexibility in matching human resources against manufacturing advances will demand flexibility in the application of seniority policies.

ELMER W. BERNITT
Vice president-automotive operations
American Motors Corp.

(*Please turn to Page 42*)

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Challenge of quality . . .

RINEHART S. BRIGHT
Group vice president-automotive mfg.
Chrysler Corp.

THE AUTOMOTIVE industry's most challenging problem of the 1960s is to improve quality.

We must continue to improve process control rather than rely upon the more conventional inspection technique. It is, of course, impractical to inspect every part that goes into an automobile. To completely check a simple bolt would require 10 to 20 separate operations.

Many control techniques are well established. Others are in the trial stage. New ones certainly must be developed. The techniques fall into three categories: Process or machine capabilities, statistical audits, and automatic monitoring devices either to sort out unacceptable parts or to control the operation.

The improvement in process control will be the responsibility of the quality engineer. He must continually review laboratory and test data. He must also know exactly how the product is performing in the customer's hands. These data must then be directly related to the manufacturing process to determine the type of control to be employed to maintain the level of assurance required. The use of automatic data processing will be a big factor in obtaining the control required.

Reduce costs . . .

PHILIP J. MONAGHAN
Vice president-manufacturing staff
General Motors Corp.

THE CHALLENGE facing the auto industry during the next decade is the never ending probe to build better products at less cost. Throughout the years of automotive history, materials and procedures of handling and shaping materials have been improved. Despite constant progress, we still strive for perfection. That postwar products have improved is evidenced by the number of automobiles more than five years old operating today.

There are further areas of improvement possible in metals and in metal alloys. There is need for improvement in foundry operations and in other methods of forming and cutting metals.

These needs, however, cannot be resolved except by greater emphasis on the part of the men who are charged with responsibility of doing industrial research. In recent years, vast strides have been made in these fields, but much more must be accomplished if we are to make a vehicle with even longer life, almost troublefree, and still priced competitively.

Research and engineering must be conscious of costs which might make adoption of otherwise sound ideas impractical in today's market.

Anticipate demands . . .

A. D. WHITMER
Vice president-manufacturing
Studebaker-Packard Corp.

DETERMINING in advance the rapidly changing desires of the public in models, styling, and engineering is probably the most challenging manufacturing problem in the highly competitive automobile industry.

The problem will be intensified in the years ahead as the population increases and as more features are added to automotive equipment.

The primary factor that complicates the problem is the growing trend toward custom building resulting from lengthy lists of optional equipment. That results in heavy expense and numerous problems involved in large inventories of materials and components.

Establishing limits in the number of models and optional features would simplify the problem, but the motoring public has been conditioned to expect a wide choice in body styles and equipment.

U. S. Auto Output

Passenger Only	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,241
April	446,739	582,869
May	542,303	611,260
June	559,474	613,136
6 Mo. Totals	2,736,719	3,809,494
July	.....	434,377
August	.....	305,514
September	.....	407,691
October	.....	617,972
November	.....	597,638
December	.....	523,422
Total	.....	6,696,108

Week Ended	1961	1960
June 24	128,216	141,247
July 1	125,297	125,868
July 8	85,889	89,769
July 15	127,157	105,113
July 22	105,166†	112,179
July 29	75,000*	107,019

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

FIRST ALL-NEW FACILITY FOR THIN TIN PLATE

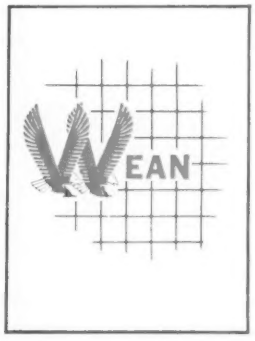
Wean will build cleaning line for Weirton Steel's expansion

Weirton Steel Division of National Steel Corporation will expand its supply of thin tin plate product for the container market by 300%—marking the first installation of processing equipment specifically designed to treat thin tin plate. The new, high-speed Wean line incorporated in this expansion will clean, chemically treat and oil the light-weight tin plate, which can be shipped to container manufacturers at reduced shipping charges and lower initial cost.

Weirton Steel will be able to handle 60,000 lb. coils on this new line, processing the thin tin plate at speeds up to 2200 fpm. Other features of the line include precision tension control, balanced rolls, and rigid design to assure uniform strip tracking.

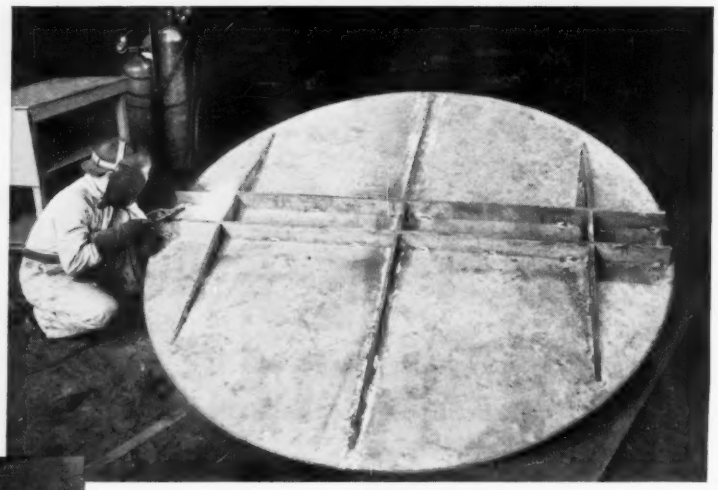
This pioneer installation designed specifically for thin tin plate is only one example of Wean's experience in this field. Over 80% of the world's supply of *all* tin plate is produced on Wean equipment—as is the thin tin plate processed by eight of the nine current producers. This unique background of engineering "know-how" can help you in planning your requirements.

THE WEAN ENGINEERING COMPANY, INC. · WARREN, OHIO

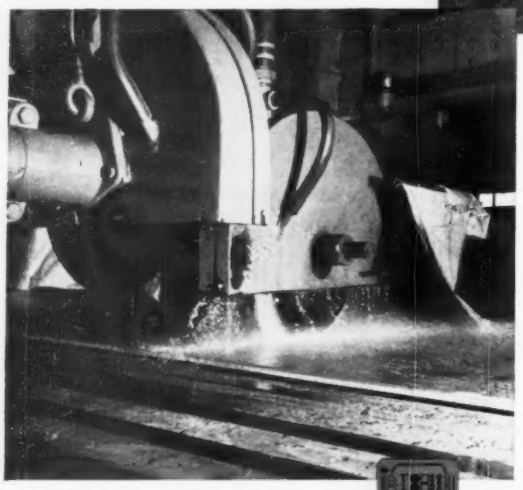


Why It Pays to Apply VALUE ANALYI to Your Stainless Steel Jobs

Here's How It Paid Off for
HENRY PRATT COMPANY
on an Unusual Stainless Fabrication



Welding gusset stiffeners to main damper disc.



Wet-process Ty-Sa-Man sawing gusset plates to finished dimensions. This cutting process eliminates warpage and chance of carbide precipitation.

Engineers of the Henry Pratt Company designed an open hearth stack shut-off damper for use with new air pollution control equipment in steel mill operations. Specifications for the large butterfly valve on this unit called for a multitude of unusual shapes to be fabricated to close tolerances from a special analysis of stainless steel plate. What's more, the production schedule on the first unit was extremely tight.

In this situation, Pratt purchasing agents turned to the House of Stainless. When the job was analyzed, it was found that Chicago Steel Service could supply the specified analysis of stainless plate. In addition, the many varied shapes could be furnished by the House of Stainless in time to meet the tight production schedule and at lower cost. This two-fold advantage was possible because of fully-integrated warehouse services, including engineered layout for maximum material savings, powder flame cutting and Ty-Sa-Man abrasive sawing.

This is just another case of Value Analysis in action on stainless steel requirements. Once again, it reveals how sound purchasing decisions save time, money and materials.

When you apply Value Analysis to your purchases of stainless steel, call on the House of Stainless for metallurgical assistance and prompt deliveries of warehouse quantities or direct mill shipments.

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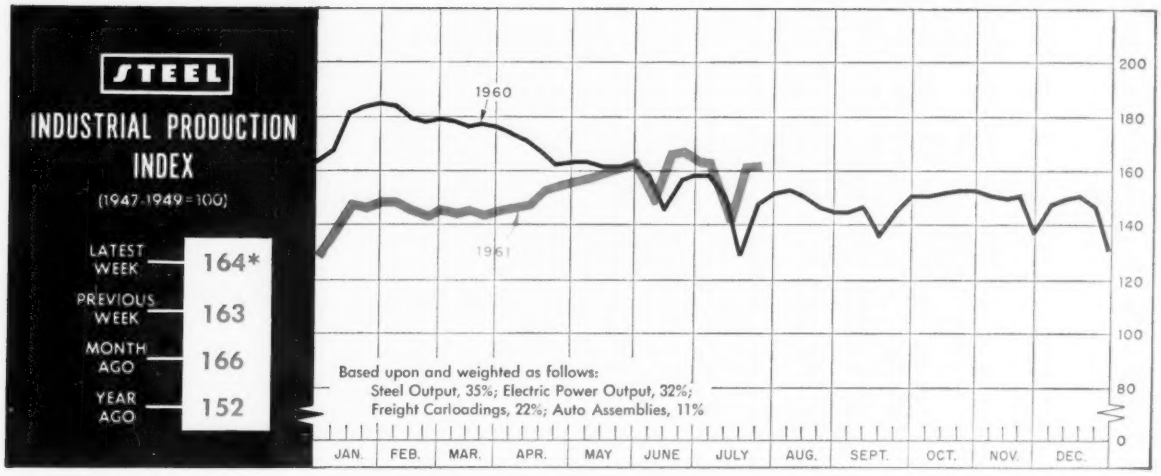


*Week ended July 22.

Uncertainty Creeping into Outlook

NUMEROUS metalworking managers lament that they are not sharing fully in the economic recovery.

As pointed out by STEEL in this column last week, the total economy is already at the prerecession level.

• **Evidence to Contrary**—There is plenty of statistical evidence of the over-all improvement. The Federal Reserve Board's industrial production index is equal to the previous peak (see graph and table, Page 46). Preliminary estimates put gross national product in the second quarter at about $515 billion (annual rate), $10 billion above the previous high, and $15 billion above the first quarter rate. Employment is gradually picking up, especially in manufacturing. (See graph and table, Page 46.) New orders for manufactured goods have been increasing since March.

Evidence that durable goods as a whole are providing the big push is nearly as impressive. Percentagewise, durables have moved up farther than nondurables since the bottom of trough was reached last February. In every component of the FRB index for durable goods manufacturing, gains were marked up in June, the latest month of record. And total durables are only fractionally below the year-ago level—some segments are at all-time highs. The biggest gains in new orders have been in the durables industries.

• **Why the Doubting?**—In the last few weeks, STEEL editors have interviewed scores of top managers in a wide variety of metalworking companies in widely separated parts of the country on conditions within their companies, industries, and localities. Almost without exception, they expressed confidence for the fourth quarter, but puzzlement about all the talk of strenuous recovery now. "The government says things are great, and I read glowing reports in the newspapers," ad-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	1,860[1]	1,858	1,520
Electric Power Distributed (million kw-hr)	15,400[1]	15,071	14,425
Bituminous Coal Output (1000 tons)	7,430[1]	1,300	7,389
Crude Oil Production (daily avg—1000 bbl)	6,900[1]	6,930	6,855
Construction Volume (*ENR*—millions)	$509.5	$594.6	$519.8
Auto, Truck Output—U. S., Canada (*Ward's*)	131,915[1]	157,832	140,031
TRADE			
Freight Carloadings (1000 cars)	600[1]	573	620
Intercity Truck Tonnage (changes from year ago)	+0.6%	−0.6%	−3.7%
Business Failures (Dun & Bradstreet)	304	220	258
Currency in Circulation (millions)[2]	$32,634	$32,797	$32,199
Dept. Store Sales (changes from year ago)[2]	+3%	+6%	+1%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$30,145	$28,970	$28,465
Federal Gross Debt (billions)	$289.2	$288.8	$288.8
Bond Volume, NYSE (millions)	$31.5	$31.7	$22.5
Stocks Sales, NYSE (thousands of shares)	13,552	14,845	12,577
Loans & Investments (billions, adjusted)[3]	$112.4	$113.3	$106.7
U. S. Govt. Obligations Held (billions)[3]	$31.5	$32.0	$27.8
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	224.4	224.8	233.3
All Commodities[6]	118.5	118.7	119.6
Commodities Other than Farm & Foods[6]	127.5	127.5	128.3

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

mitted one Midwestern metalworker. "But it must be in my competitor's shop, because production here has barely crept up since our low point."

Few companies report that their own operations are anywhere near the all-time peak shown in the production indexes. However, the metalworker who says his business is still going down is also a rarity. Most feel that the bottom has been reached and that any improvement through the summer and early fall will be slow. Orders are coming in a little faster than in the early part of the year, but backlogs are still not large enough to offer a real cushion against any sudden slackening.

• **Stop and Go** — Many company officials report that they were fairly encouraged two months ago because of the pickup in early March and April. But toward the end of May, business slowed and hasn't regained its speed. There is little pessimism because of the change of pace, but there is noticeable disappointment that things aren't as good as expected.

• **Reasons for Concern** — Five reasons are cited most often for the altered attitude.

1. Labor contract negotiations in the auto industry raise the possibility of a strike in another month. While conditions still favor a peaceful settlement, few managers are willing to bet on it and make plans accordingly. Major suppliers report that motordom's purchasing agents are placing orders as if there will be no strike but releases are slow in coming.

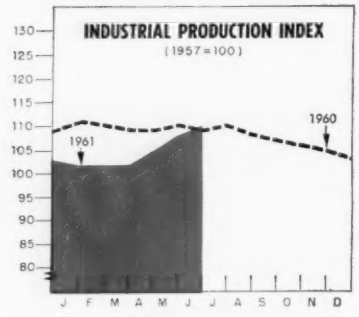
2. The early shutdown of the auto industry also has caused some confusion among suppliers. One Milwaukee supplier told STEEL: "Our fiscal year is going to look terrible because it will include two model changes."

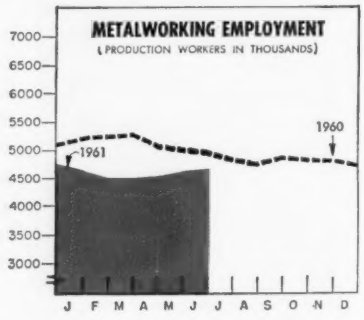
3. The summer doldrums have dampened some of the recovery enthusiasm. But many businessmen claim that even when taking that into account, things still aren't what they should be.

4. The Berlin situation has many metalworkers concerned. One Minneapolis businessman tied it in with the auto negotiations. "Walter Reuther is not dealing from strength this year. But if we go on anything like an emergency footing, you can bet that he will grab the situation and make the most of it."

5. Almost everybody is discouraged about profits. Even if business accelerates as expected in the fourth quarter, earnings are not expected to keep pace. For that reason, some are looking for a smaller pickup in capital goods than the surveys predict.

THE BUSINESS TREND





(Seasonally adjusted)

	Total Production 1961	Total Production 1960	Total Mfg. 1961	Total Mfg. 1960	Durables Mfg. 1961	Durables Mfg. 1960
Jan.	102	111	101	112	95	111
Feb.	102	110	101	110	94	109
Mar.	102	109	102	110	95	108
Apr.	105	109	105	109	99	106
May	108	110	108	110	103	107
June	110*	109	110*	110	105*	105
July	...	110	...	110	...	106
Aug.	...	108	...	108	...	104
Sept.	...	107	...	107	...	102
Oct.	...	106	...	106	...	101
Nov.	...	105	...	104	...	98
Dec.	...	103	...	103	...	96
Avg	...	108	...	108	...	104

Federal Reserve Board. *Preliminary.
Charts copyright, 1961, STEEL.

1960	Prim. Mtls.	Fab. Prod.	Machinery	Elec. Mchy.	Trans. Equip.
June	970	840	1,154	859	1,127
July	924	817	1,130	850	1,105
Aug.	910	819	1,112	861	1,036
Sept.	905	835	1,104	877	1,135
Oct.	891	834	1,087	839	1,149
Nov.	871	816	1,087	867	1,153
Dec.	851	794	1,081	844	1,125
1961					
Jan.	838	771	1,075	842	1,068
Feb.	829	755	1,077	835	1,012
Mar.	833	750	1,076	830	1,013
Apr.	845	762	1,081	827	1,018
May	877	787	1,083	835	1,055
June	898	797	1,080	835	1,077

U. S. Bureau of Labor Statistics.

Uniformity Lacking in Upturn

The unevenness of the recovery is noticeable not only industry by industry, but also area by area. For instance, attitudes vary markedly between Minneapolis-St. Paul and Milwaukee.

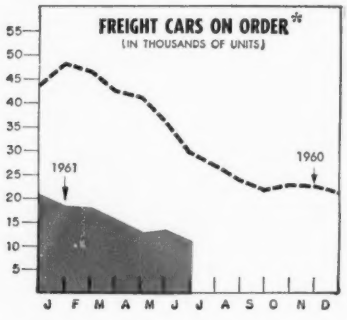
In the Twin Cities, optimism is everywhere. While the pickup hasn't measured up to the FRB index, it has been felt in most avenues of commerce and industry. Unemployment is less than 6 per cent, and the workweek is close to 40 hours.

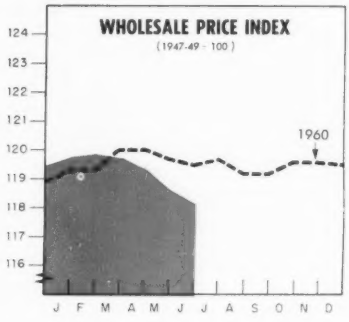
One reason for the feeling of confidence is the variety of industry. Less than a third of the employment is in manufacturing. And many of the leading manufacturing companies—such as Motec Industries Inc., Minneapolis-Honeywell Regulator Co., and Minnesota Mining & Mfg. Co. (3M)—have diversified to eliminate peaks and valleys in production.

J. C. Duke, executive vice president (sales administration) of 3M, told STEEL that the coated abrasive industry has historically led the national economy by a month or two. "Our orders have been on the uptrend for four consecutive months, although there has been a slacking off since the automotive industry started its model changeover."

One cause for concern in this area is the drought that hit the wheat belt. Edmund F. Buryan, president of Motec, said that it is likely to affect late summer farm equipment sales, but the main selling season is over, and it was a good one.

In Milwaukee, the outlook is less certain. In an early July poll conducted by the Milwaukee Association of Commerce, 68 out of 126 firms expected gains in the third quarter over the second, which was only slightly better than the first quarter. But the gains were expected to be small. Thirty-two firms look for no increase, and 26 see declines.





	Domestic Awards		Backlogs (end of month)	
	1961	1960	1961	1960
Jan.	1,339	5,742	18,894	48,170
Feb.	1,536	3,211	18,429	45,323
Mar.	1,796	1,957	15,801	42,131
Apr.	2,040	5,352	13,658	41,003
May	3,666	2,285	13,964	36,106
June	1,214	316	11,821	29,555
July	....	1,331	.....	26,658
Aug.	....	1,333	.....	23,866
Sept.	....	2,206	.....	21,662
Oct.	....	5,864	.....	22,900
Nov.	....	3,740	.....	22,781
Dec.	....	2,705	.....	21,070
Total	....	36,368		

*Domestic only.
American Railway Car Institute.

	All Commodities		Other Than Farm & Foods	
	1961	1960	1961	1960
Jan.	119.8	119.3	128.0	128.8
Feb.	119.9	119.3	128.0	128.7
Mar.	119.8	120.0	128.1	128.6
Apr.	119.4	120.0	128.0	128.7
May	118.7	119.7	127.6	128.2
June	118.2	119.5	127.4	128.2
July	....	119.7	....	128.2
Aug.	....	119.2	....	128.2
Sept.	....	119.2	....	127.9
Oct.	....	119.6	....	128.0
Nov.	....	119.6	....	127.9
Dec.	....	119.5	....	127.9

U. S. Bureau of Labor Statistics.

Perhaps one reason for caution in this area is its heavy dependence on the capital goods industries, which lag the general economy. However, Robert S. Stevenson, president of Allis-Chalmers Mfg. Co., is confident that the upturn in capital spending has begun. He is encouraged by the increase in inquiries—he calls it the "significant development of the second quarter." There is every reason to look for the upturn indicated in the numerous capital goods surveys, he feels.

One sales vice president for electrical equipment agrees that inquiries are up, but he says: "They aren't being turned into orders."

A. O. Smith Corp. officials are confident the low point has been passed, because business has improved to some extent in each month since February. Right now, the company is working on frames for the 1962 cars, so employment is at a fairly good level.

Unemployment in Milwaukee is on a par with the Twin Cities—lower than the national average percentagewise. And most of the statistical measurements of the area's economic health are improving. Despite this, there is a wide feeling all is not what it should be.

Machine Tool Orders Up

Producers of machine tools marked up a comparatively good month in June, but so far in 1961 have been unable to put two good months back to back. The National Machine Tool Builders' Association reports that total new orders last month came to $60.6 million vs. May's $49.6 million. Both cutting and forming type tools contributed to the improvement. Shipments moved up to $64.3 million from $57.9 million the previous month.

NMTBA officials warn against accepting one month's figures as indicative of a trend. They point out that even with the June improvement, first half orders for cutting tools were only 3 per cent ahead of the year-ago period and 7.4 per cent ahead of the recessionary second half of 1960. Forming type tools were behind both the first and second half 1960 totals.

Shipments for the first half of 1961 for cutting tools were below the comparable 1960 period and fractionally ahead of last year's second half. Shipments of forming tools from January through June were ahead of both six month periods last year.

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
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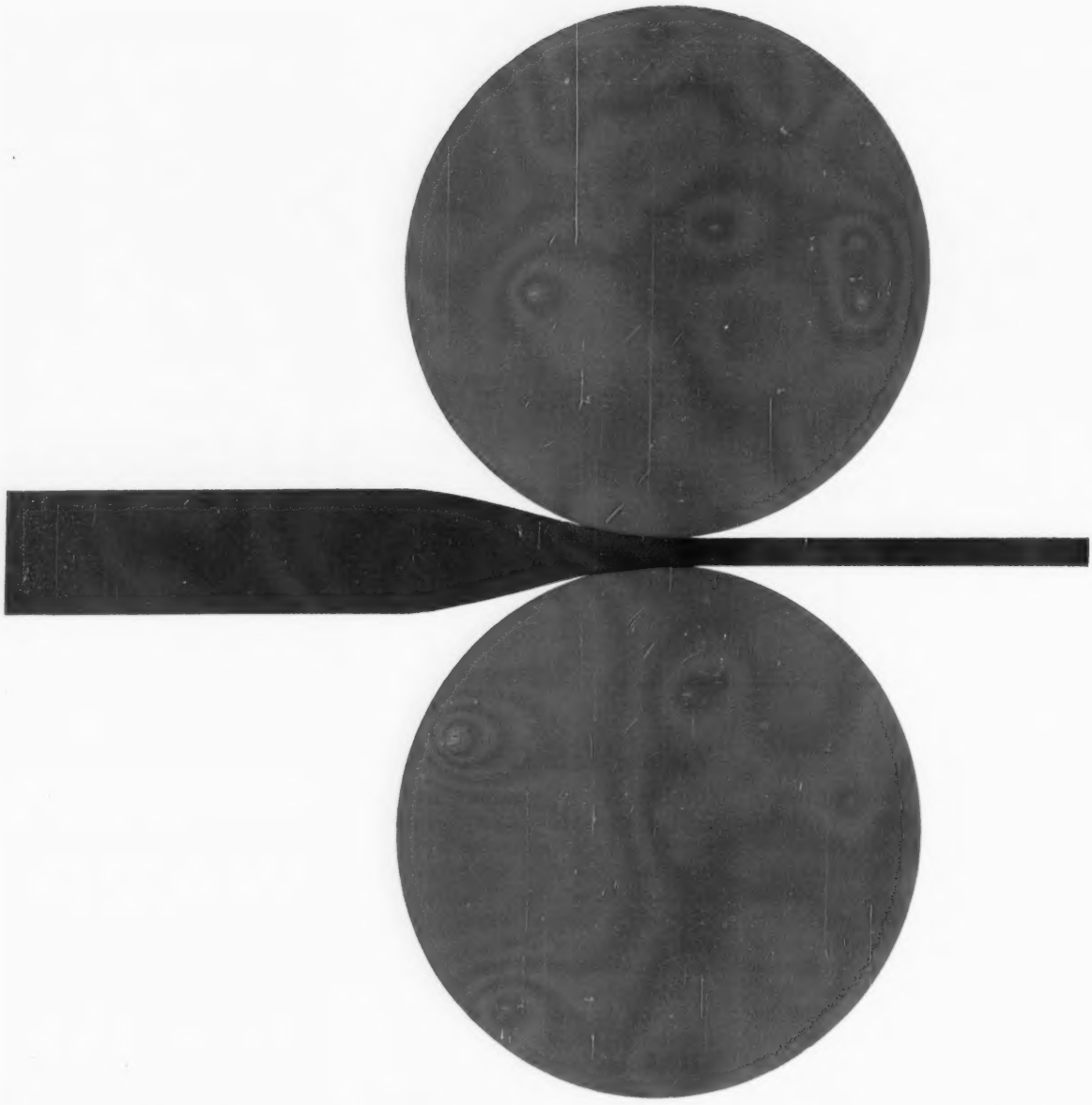
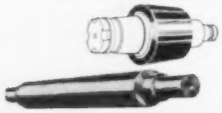
WARD
For Countless Uses
of
SPRING STEEL
AMERICA'S LEADING SUPPLIER
Where
SERVICE and QUALITY
is the rule
WARD STEEL CO.
Boston—Cambridge, Mass.
Chicago, Ill.—Greensboro, N. C.



Heppenstall rolls it, cuts it, handles it



Back-up roll sleeves and forged hardened, ground rolls

Crop shear knives

Tongs—stock and custom designed

From melt shop to finished product, Heppenstall equipment plays an important part in modern steelmaking operations. Top-rate performance is provided by Heppenstall's back up roll sleeves and rolls—made from highest quality alloy steel, forged and heat treated to obtain maximum density, grain refinement and controlled hardness. Long on service is the industry-wide reputation of Heppenstall solid tool steel shear knives—for we use our own electric induction steels to assure maximum knife quality. If it has to be handled, Heppenstall tongs can help you. Regardless of shape, weight, or size, Heppenstall tongs can speed materials handling operations with greater efficiency and safety. For experienced Heppenstall service, or specific information, call our nearest Heppenstall Representative or write us direct.

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H M H

SCHAEFFER E. SPECHT
Buell gen. sales mgr.

PAUL N. GUSTAFSON
Cone-Drive Gears mgr.

JOHN L. WILKES
Mallory Metallurgical sales

J. JAMES OFFUTT
Green Fire Brick exec.

Schaeffer E. Specht was made general sales manager, **Buell Engineering Co.**, New York, and its Northern Blower Div. in Cleveland.

Paul N. Gustafson was made manager, **Cone-Drive Gears Div.**, Detroit, Michigan Tool Co., to succeed **Fred E. Birtch**, retired. Mr. Gustafson was manager of Michigan Tool's Traverse City, Mich., plant. **George A. Schimmin** was made sales manager, Cone-Drive Gears Div.

John C. Crouch was elected vice president of **McKay Co.**, Pittsburgh. He continues as assistant secretary.

Arnold K. Weber was made staff vice president-manufacturing, **Radio Corp. of America**, New York.

Alexander L. Bupp was made director of purchases, **Bucyrus-Erie Co.**, South Milwaukee, Wis. He was director of planning. He continues to direct the firm's commercial evaluation activities.

John L. Wilkes was made general sales manager, **Mallory Metallurgical Co.**, Indianapolis, division of P. R. Mallory & Co. Inc. He succeeds **James L. Nichols**, named manager of Mallory Distributor Div.

Cleaver-Brooks Co., Milwaukee, named **Glenn W. Leupold** to a new post as managing director of foreign manufacturing. In addition, he is in charge of engineering developments.

Francis M. Fives was made vice president and general sales manager of **Elliott Co.**, Jeannette, Pa. He was assistant general sales manager.

William J. Pinkerton was made president and general manager, **Micromatic Hone Corp.**, Detroit. He succeeds **Don S. Connor**, retired because of ill health. Mr. Pinkerton was executive vice president and assistant general manager. **Ray W. Gauss** was made executive vice president-treasurer.

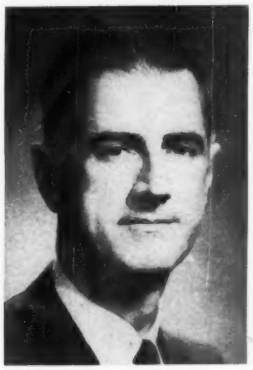
J. James Offutt was elected executive vice president, **A. P. Green Fire Brick Co.**, Mexico, Mo. Since September, 1960, he has been vice president-general manager, responsible for sales, research, and operations. He succeeds **L. J. Miller**, retired.

D. L. Bennett, former division superintendent, Tool & Machinery Mfg. Div., **Acme Steel Co.**, Chicago, was made general manager, Tool & Machine Engineering and Manufacturing.

H. S. Bishop was made manager, Railway Trackwork Mfg. Div., **Midwest Steel Corp.**, Charleston, W. Va. Midwest recently purchased the division, at Huntington, W. Va., from H. K. Porter Company Inc. and moved the manufacturing facilities to a new plant at Pomeroy, Ohio.

Kenneth E. O'Shaughnessy was appointed sales manager, Air-Moving Divisions, **Torrington Mfg. Co.**, Torrington, Conn. He will supervise

ALEXANDER L. BUPP
Bucyrus-Erie purchasing dir.



FRANCIS M. FIVES
Elliott v. p.

WILLIAM J. PINKERTON
Micromatic Hone president

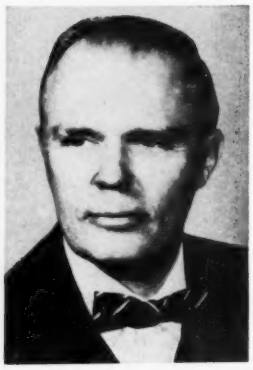
KENNETH E. O'SHAUGHNESSY
Torrington div. sales mgr.

HAROLD J. ZUSKE

ALBERT D. GILCHRIST

Leece-Neville division vice presidents

DONALD E. MOAT



JOHN F. QUEREAU

Leeds & Northrup management changes

sales and field services for both the Connecticut and Indiana plants.

J. S. Allt, vice president-treasurer, assumes additional duties in management of all divisions of **Leece-Neville Co.**, Cleveland. **Harold J. Zuske** was named to the new post of vice president-general manager, Fractional Horsepower Motor Div. **Albert D. Gilchrist** was named vice president-general manager, Alternator & Standard Products Div., also a new post. **Robert G. Hill** was made general sales manager; **William E. Carter** sales manager of original equipment.

Norman A. Matthews was named group leader-ferrous metallurgy of the Research Laboratory of **International Nickel Co. Inc.** at Bayonne, N. J.

O. R. Magoteaux, formerly with National Lead Co. of Ohio, Fernald, Ohio, transferred to **Chas. Taylor Sons Co.**, Cincinnati, subsidiary of National Lead Co. His new duties concern research and development of new processes and products.

Francis M. Miller was made superintendent, Electric Dept., at **Dravo Corp.'s** Neville Island, Pa., plant.

Arthur Lind was made project engineer, Rolling Mill Div., Salem, Ohio, **E. W. Bliss Co.**

Dravo Corp. named **Jack Wade** superintendent for construction of its Stora-Kaldo oxygen steelmaking facility at the Roemer Works of Sharon Steel Corp. in Farrell, Pa.

C. M. Hargraves, manager of the Industrial Equipment Div. of **R. C. Mahon Co.**, Detroit, was appointed a vice president.

Southern Iron & Equipment Co., Chamblee, Ga., appointed **Robert S. Lynch** general manager; **J. O. Harris** assistant general manager; **J. F. Mims** purchasing agent. Mr. Lynch was chairman of Atlantic Steel Co. He recently has been executive vice president of Ford-Lynch Associates.

Donald E. Moat, former vice president-director of marketing, was made vice president-government and foreign relations, **Leeds & Northrup Co.**, Philadelphia. **John F. Quereau**, former vice president-director of manufacturing, was made vice president and director of marketing. **Elwood F. Rogge** was made director of manufacturing.

Hugh Beatty was named to the new post of manager of marketing of the Aerospace Branch, **Librascope Div.**, Glendale, Calif., General Precision Inc.

Charles C. Warne Jr. was made sales assistant to the vice president of **Rockwell-Standard Corp.'s** Industrial Products Group, Coraopolis, Pa.

W. L. Myers and **G. E. Stults** were made assistant sales managers at Detroit for **Republic Steel Corp.**

Jack D. McDaniel was made assistant manager-sheet and strip sales for **Kaiser Steel Corp.**, Oakland, Calif.

Graham B. Brown joined **Stauffer Chemical Co.** as general manager, Metals Div., Richmond, Calif.

C. J. Weber was named assistant manager; **A. C. Chiazza** sales manager of **Westinghouse Electric Corp.'s** Aerospace Electrical Dept. at Lima, Ohio.

Albert J. Wein was made manager of **Steelmet Inc.'s** Nonferrous & Nickel Alloy Div., Pittsburgh.

Bert Fleming was made senior manufacturing engineer, electromechanical devices, for **Daystrom Inc's** Military Electronics Div., Archbald, Pa.

O. R. MAGOTEAUX
joins Chas. Taylor Sons

C. M. HARGRAVES
R. C. Mahon v. p.

ROBERT S. LYNCH
Southern Iron gen. mgr.

Raymond A. Frick and **Victor L. Persbacker** were elected vice presidents of **American Brake Shoe Co.**, New York, and were named to the management committee. Mr. Frick also was named group executive for railroad products. Mr. Persbacker continues as comptroller. Mr. Frick was executive vice president, Railroad Products Div. He succeeds **Stephen S. Conway** (retired) as group executive and division president Aug. 1.

Earl Langenberg was made chief engineer, **Keystone Steel & Wire Co.**, Peoria, Ill., to succeed **John Newell**, retiring Dec. 31. **John Buehler** replaces Mr. Langenberg as assistant chief engineer. **William Herman**, former rolling mills superintendent, has retired.

J. R. Connell was named general manager, **Green River Steel Corp.**, Owensboro, Ky. He was administrative assistant to the president of Jessop Steel Co., parent company. **G. E. Cassidy** was made general manager-operations. **George H. Chubb** was named general sales manager.

J. D. Reid was made manager of aluminum sales by **Hill-Chase Steel Co.**, Baltimore.

Carl E. Johnson was made division sales manager, **Sparton Automotive Div.**, Jackson, Mich., Sparton Corp.

Robert L. Wicker was made manager of distributor sales, **American Hoist & Derrick Co.**, St. Paul. He was general sales manager of Dart Truck Co., and more recently served in the same capacity with Bros Inc., Minneapolis.

RAYMOND A. FRICK
American Brake Shoe v. p.

JOSEPH M. ENGEL
Republic metallurgist

JACK KAYE
Luria International v. p.

Joseph M. Engel was made chief metallurgist for the Buffalo steel plant of **Republic Steel Corp.** He joined Republic's Metallurgical Dept. in Buffalo in 1939, and since 1953 has been assistant chief metallurgist.

James R. Higgins was made purchasing manager-metals for **Olin Mathieson Chemical Corp.**, New York.

Howard J. Atkinson was promoted from regional sales manager to general sales manager, **Brookfield Wire Co. Inc.**, Brookfield, Mass.

E. M. de Windt, vice president of **Eaton Mfg. Co.**, Cleveland, has also been named president of the newly established Eaton International Div., which consolidates Eaton's foreign activities.

Robert Linquist was appointed vice president - engineering, **Security Valve Co.**, South Pasadena, Calif., subsidiary of Menasco Mfg. Co. He was chief engineer, Annin Co.

Jack Kaye was elected vice president, **Luria International Div.**, Luria Bros. & Co. Inc., New York, division of Ogden Corp.

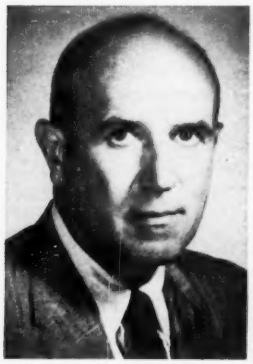
Jack T. Gentry was made vice president, **U. S. Engineering Co.**, division of Litton Industries, Beverly Hills, Calif. He continues as general manager.

Frank J. Bednarczyk was made chief quality engineer, **SKF Industries Inc.**, Philadelphia.

Kaiser Aluminum & Chemical Corp. named **Robert F. Buechner** manager of its integrated primary aluminum and fabricating works at Ravenswood, W. Va.; and **J. H. Williams** manager of its Trentwood, Wash., rolling mill. Mr. Buechner succeeds **Charles D. Smith**, transferred to an executive assignment attached to corporation headquarters at Oakland, Calif.

Donald E. Sailer was made manager of manufacturing engineering, Transducer Div., Monrovia, Calif., **Consolidated Electrodynamics Corp.**

Robert Just was named chief industrial engineer at **Indiana Steel Products Div.**, Valparaiso, Ind., Indiana General Corp.



ROBERT L. WICKER
American Hoist sales post

E. M. DeWINDT
Eaton International pres.

ROBERT LINQUIST
Security Valve v. p.

OBITUARIES...

R. K. Turner, 59, a vice president of **Union Carbide Corp.**, New York, died July 18.

W. K. Child, 56, president, **Illinois Iron & Bolt Co.**, Carpentersville, Ill., died July 12.

New Beryllium Plant Lifts Efficiency and Cuts Costs

SUBSTANTIAL reduction in the average price of finished beryllium parts (now about $150 a pound) is forecast by George S. Mikhalapov, president of Brush Beryllium Co., Cleveland. He recalls that only three years ago the figure was around $250 a pound.

A new, $1 million, 90,000 sq ft plant "greatly enhances our efficiency in turning out finished beryllium parts," he adds. It is one aspect of an integrated effort at Brush to lower the cost of beryllium while increasing production capacity to meet growing demands. The new facility boosts the company's fabricating capacity by 50 per cent. When completed later this year, it will represent a $3 million investment in plant and equipment and will replace three smaller fabricating facilities the company operated in Cleveland.

New equipment will include about $200,000 worth of turret, engine, and tracer lathes. A 120 in. King, double ram, vertical boring mill is the plant's largest piece of equipment. A new tracer lathe unit can reproduce forms in beryllium metal to a tolerance of 0.00005 in.

The new plant on St. Clair Avenue near E. 178th Street, Cleveland, is part of an over-all expansion program underway at Brush. The company's Elmore, Ohio, plant is undergoing a $6 million expansion which will more than double its capacity to produce basic beryllium metal. Brush opened a 28,000 sq ft plant last year near Reading, Pa., for the precision rolling of beryllium copper and other alloys. The company also opened a beryllium metal machining plant in Hayward, Calif., to serve missile and aircraft manufacturers along the West Coast.

Herbrand Div. Sold

Bingham-Herbrand Corp., Toledo, Ohio, subsidiary of Van Norman Industries Inc., sold the forging machinery and equipment of its Herbrand Div., Fremont, Ohio, to American Brake Shoe Co., New York. Herbrand will continue to operate in Fremont. The hand tool portion of the business will be transferred to another Van Norman Industries plant.

Braden Copper Expanding

Braden Copper Co. has launched a $6 million project to increase the productive capacity of its mine, mill, and smelter facilities near Rancagua, Chile. Annual capacity will be raised to 191,200 tons of copper.

Kaiser Engineers International, Oakland, Calif., will provide engineering, procurement, and construction management services throughout the program which will be completed by Dec. 31.

Lath Plant Enlarged

Alabama Metal Lath Co., Birmingham, is adding 32,000 sq ft to its 85,000 sq ft plant. Cost, including equipment: About $1 million. The addition is scheduled for completion in September.

Thompson Wire Expands

Thompson Wire Co., Sparrows Point, Md., has completed installation of two additional portable bell, gas fired annealing furnaces and six more furnace bases. The firm produces steel strip. William Dockendorff is plant manager.

Joy Mfg. Consolidates

Joy Mfg. Co., Pittsburgh, will expand some of its larger facilities, relocate several activities, and close two small plants, says W. L. Wearly, president. The steps will conclude a two year program to achieve greater operating efficiencies by consolidating operations at fewer locations.

About 20,000 sq ft of office space will be added to the Coal Machinery Div.'s engineering center at Franklin, Pa. About 30,000 sq ft of manufacturing space will also be constructed at Franklin.

The manufacturing and engineering activities of Joy's subsidiary, Compton Inc., will be moved from Clarksburg, W. Va., to Franklin. The Coal Machinery Div.'s Convevor Dept. will be moved from New Philadelphia, Ohio, to Franklin.

The space made available at New Philadelphia plus a 35,000 sq ft expansion will permit moving the company's Electrical Products Div. from St. Louis to New Philadelphia.

Production at the Claremont, N. H., plant will be increased by the addition of gear and chain manufacturing.

Joy's Baash-Ross Div. has achieved major economies by concentrating six, scattered, oil tool manufacturing operations into two major locations: Long Beach, Calif., and Houston.

Air Products Opens Plant

Air Products Inc., Allentown, Pa., has placed on stream its $6 million plant in Granite City, Ill., with a daily capacity of more than 170 tons of liquid and gaseous oxygen. Production, purification, and storage facilities provide tonnage quantities of liquid and gaseous oxygen, nitrogen, and argon; and gaseous acetylene, hydrogen, and helium. The plant's principal customer is Granite City Steel Co. which recently completed an expansion program.

Research Center Planned

The National Bureau of Standards is building research facilities near Gaithersburg, Md., to house its Washington staff. The $104 million installation will consist of about 20 buildings, including administrative, office, special and general purpose laboratories, and service buildings. Construction is to be carried out in successive stages as appropriations are made available by Congress. The first two buildings being constructed are the engineering mechanics laboratory and the boiler and refrigeration plant; construction of the third, a radiation physics laboratory, is expected to be started later this year. The first three buildings are scheduled for completion in 1963.

Vulcan to Build Plant

Vulcan Mold & Iron Co., Latrobe, Pa., will construct a $7.5 million ingot mold manufacturing plant on Fort Road, Trenton, Mich. The main building will have about 170,000 sq ft of production floor space. The plant will have an initial annual capacity of about 180,000 tons of ingot molds. Rust Engineering Co., Pittsburgh, is the project engineer and will contract and supervise construction.

Koppers to Repair Ovens

Engineering & Construction Div., Koppers Co., Pittsburgh, will make major repairs to two coke oven batteries at the Indiana Harbor (Ind.) Works of Inland Steel Co. Each battery has 73 Koppers-Becker underjet ovens. Fieldwork is expected to begin in October and completion is expected in late 1962. The Indiana Harbor Works has seven coke oven batteries with a total of 531 ovens.

CONSOLIDATIONS

Golden-Anderson Valve Specialty Co., Pittsburgh, purchased **Rotary Valve & Engineering Corp.**, Birmingham, manufacturer of circular rotary valves and linear valves for high pressure and high velocity applications. The subsidiary has been renamed Rotary Valve Corp. and operations have been moved to Pittsburgh.

Mathews Conveyer Co., Ellwood City, Pa., purchased **Wilkie Co.**, Philadelphia, maker of telescopic roller, wheel, and belt conveyors. John McLaughlin is general manager of the Wilkie operation.

J. B. Williams Co. Inc., Newark, N. J., acquired **Landers, Frary & Clark**, New Britain, Conn., maker of electrical and household appliances. M. B. Rosenhaus, president and chairman of the Williams firm, has been elected to the same positions in the New Britain firm.

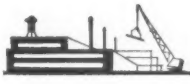
Chemical Contour Corp., Gardena, Calif., acquired **Empcor**, Burbank, Calif., manufacturer of etched circuit boards for the electronics industry. Tracy T. Day has been elected a vice president of Empcor and will be general manager.

R. M. F. Inc. acquired **Fab Tool & Mfg. Corp.** and moved operations to 195 Allwood Rd., Clifton, N. J. A. F. Fabiano has been named vice president in charge of operations at the plants in Clifton and King of Prussia, Pa. The company makes missile motors and related hardware, electronic components, and precision metal parts.

Coleman Engineering Co. Inc., Los Angeles, acquired **Speed-D-Burr Corp.**, Wilmington, Calif., metal product finisher and producer of finishing compounds and finishing machinery. The 10,000 sq ft plant of Speed-D-Burr will be more than doubled in size to house operations of Coleman's Engineering Div., now in Torrance, Calif.

Annealing Line Ups Gary Mill Output

INSTALLATION of this high speed, continuous annealing line, coupled with present box annealing facilities, enables U. S. Steel's Gary (Ind.) Sheet & Tin Mills "to provide every type of tin plate production required by can manufacturers," says E. H. Gott, executive vice president-production. The line handles cold reduced strip coils ranging from 22 to 38 in. in width.



NEW PLANTS

Wheeling Corrugating Co., subsidiary of Wheeling Steel Corp., Wheeling, W. Va., will construct a culvert fabricating and bituminous dipping plant at Jeffersonville, Ind. The $500,000 installation is scheduled to be completed this fall. The company is building a similar plant at Havana, Ill.

Fenwal Inc., Ashland, Mass., is erecting a 106,000 sq ft building on Leland Avenue, that city, to house major portions of its engineering and manufacturing departments. The plant will contain all Fenwal heavy production machinery, light assembly areas, engineering offices and laboratories, and executive offices.

from machine tools to typewriters . . .

. . . Robbins & Myers motors power them all!

Each R&M motor, 1/200 through 200 HP, is electrically and mechanically designed with life-prolonging features which assure dependable operation, simplified installation and low maintenance. From rugged machine tools to complex business machines, there's an R&M motor for every job . . . Fractional and Integral H.P. Motors and Motor Parts in all popular mountings, electrical types and enclosures. Most are ready for off-the-shelf delivery. Others can be quickly produced. Should you require custom motors, R&M's experienced application engineers, aided by modern electronic computers, can furnish the one design best suited to your needs.

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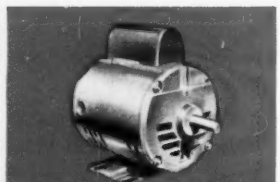
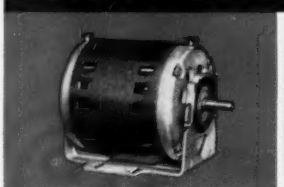
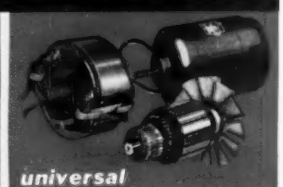
integral motors, 1 thru 200 hp


fractional motors, 1/200 to 1 hp


special application, 1/100 thru 1/3 hp


universal or series parts, 1/50 to 1/2 hp

ROBBINS & MYERS, INC., Springfield, Ohio

Fractional and Integral HP Electric Motors • Electric Hoists and Overhead Traveling Cranes • Moyno® Industrial Pumps
Propellair® Industrial Fans • R & M-Hunter Fans and Electric Heat • Trade-Wind Range Hoods and Ventilators

Subsidiary companies at: Memphis, Tenn., Pico Rivera, Calif., Brantford, Ontario.

Technical Outlook

ION ENGINEWORK—The National Aeronautics & Space Administration will negotiate a contract with the Astro-Electronics Div., Radio Corp. of America, for the development of a payload capsule to test ion engines in space. The engines would propel spacecraft with electrically charged particles expelled at high velocities by electric or electromagnetic fields. The contract calls for seven capsules, three for ground tests and four for space flight. The engines will operate at low temperature, are small, use little fuel, and can be reignited during flight. The engines could operate for years in space, says NASA.

RADIOACTIVE TATTOO—Stainless steel tubes are being used for heat exchange tube banks in Sweden's R3/Adam power producing nuclear reactor. The first such unit for Sweden, it will be of 70 megawatt capacity. A radioactive isotope is incorporated in the steel (an austenitic alloy with a maximum carbon of 0.03 per cent, low cobalt, and 0.05 per cent nitrogen) to permit positive identification of each heat. Finished tubes are inspected ultrasonically.

WELDING ENGINEER OF TOMORROW—"Within the next decade, we will see a new kind of welding engineer trained by the welding industry itself to handle the increasingly wide variety of more and more specialized welding processes," states A. Lesnewich, supervisor of welding research, Air Reduction Sales Co., a division of Air Reduction Co. Inc., New York. His reasons: We are beginning to realize the importance of welding variables (current, voltage, heat input, metallurgy, etc.); quality is getting more important; the industry is getting increasingly competitive.

HOW CRYSTALS GROW—Researchers at the Bureau of Standards, Washington, have completed a study on the growth of zinc whiskers that permits evaluation of two theories on crystal formation. One postulates the formation of two dimensional nucleuses on a completed surface layer; this involves high, local, vapor supersaturation levels. The other, the screw dislocation theory, depends on a local dislocation to form a monatomic "step"; growth is continuous and screw shaped, and a lower supersaturation of the vapor is required. Growth, measured in a vacuum system at low supersaturation levels, confirms the screw dislocation theory for zinc. Other metals are being studied; results will aid in understanding crystal growth of metals.

SEVEN LEAGUE POWER BOOTS—Investigators have about decided that it's feasible to move up to 25 billion kilowatt hours of electricity a year over distances up to 1000 miles with superhigh (460,000 to 690,000) voltages). A study of the factors involved has been completed by Westinghouse Electric Corp., Pittsburgh, and Pacific Power & Light Co., Portland, Oreg.

CONDUCT RADIATION TESTS—Wearing of plated parts like engine valves can be measured and compared with a radiation tester developed by Eaton Mfg. Co.'s Detroit laboratory. The equipment projects its readings in a correlated, direct numerical value.

STRONGER MOLYBDENUM—Precipitation hardening procedures can enhance the high temperature tensile strength and the creep rupture strength of Mo-TZC alloy (molybdenum with 1 per cent titanium, 0.1 per cent zirconium, 0.14 per cent carbon). Properties may even exceed those obtained by working, when the tests are run at elevated temperatures. The dispersed phase is thought to be primarily carbides of molybdenum and titanium.

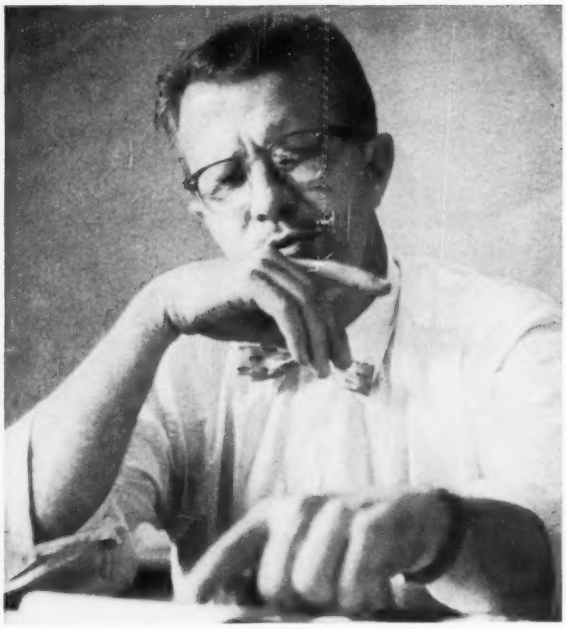
BUTTWELD TRICK—An unconventional aluminum buttwelding technique at the Puget Sound Naval Shipyard does in two passes what used to take four to six. Production has more than doubled. Automatic, inert gas, shielded metal arc equipment is used with high currents. A square butt joint is used instead of a single-Vee. The gas is a mixture of 80 cu ft of helium and 10 cu ft of argon an hour. Using 375 amperes of current at 32 volts, the 3/32 in. diameter electrode produces the approved welds at 20 in. a minute. The passes (one from each side) overlap about 3/16 in. The new technique is reported to use less than half the former amount of inert gas and electrode wire.

Tips for Better Electroplating

DR. C. L. FAUST: Look at electroplates as materials and provide specifications for the properties needed to do a job

WILLIAM H. SAFRANEK: The onus of becoming product oriented lies as heavily on purchasers of plated coatings as it does on the supplier

● "ONE OF OUR metallurgists asked us to put a nickel plate on a part. We asked what properties he wanted or how he intended to use it (to give him the right kind of plate). We were informed that the metallurgist had decided nickel was the metal to have on the surface, and it was none of our business what he wanted to use it for. This left us without any opportunity whatever to decide how to give him what he wanted because he didn't tell us what he wanted," says Battelle's Dr. Faust.



JOHN G. BEACH: A close plater-purchaser plan of operation can end many common errors and greatly improve quality

GLENN R. SCHAER: Too often the plater is not cognizant that preparations for plating are really the cheapest part of the operation

• **TOO OFTEN** a plater cannot contribute to product design because the customer doesn't or won't give him enough information about the application. STEEL asked a panel of experts at Battelle Memorial Institute, Columbus, Ohio, to pinpoint such shortcomings and to offer remedial suggestions.

Here is what they say:

• **A big increase in quality and reduced costs are advantages of a close, plater-purchaser relationship.**

They can consider the metallurgical aspects of a job, says J. G. Beach. For example: Common mistakes, such as specifying decorative type castings for high temperature conditions, can be eliminated, and other things, such as bond strength, corrosion resistance, and surface brightness, can be improved.

• **Specify environment, properties, strength, corrosion resistance, finish brightness—just as if you were buying a piece of metal.**

Look at electroplates as materials, and provide specifications for the properties needed to do a job, says Dr. C. L. Faust. If those are done, the way parts are processed is unimportant. He also thinks: Perhaps electroplaters must become more product oriented or more materials oriented and less process oriented. Much electroplating today is oriented processing . . . then testing to see if the process has given the required quality.

W. H. Safranek adds: The onus of becoming product oriented lies as heavily on purchasers of plated materials as it does on the supplier of electroplated coatings.

The first step in any product, says Dr. Faust, is to design it and to choose the materials. He recommends: Consider electroplating at this stage because the quality of the material, its surface condition, and its shape are factors that will influence the quality of the coating.

A plate can be perfectly sound as far as electrodeposition is concerned, but it can be unusable due to an improper base. Be wary of surface imperfections; they project right into the finished coating. The base affects adherence, porosity, and other aspects of quality.

Too often, a plater accepts material that should be refused. A plater cannot be expected to take any kind of surface that happens along and expect to make a high quality product out of it, says Dr. Faust. The day is coming when the plater will have specifications on what he will accept and what he will not accept.

• **There is a considerable amount of information on the properties of commonly used platings (nickel, copper, chromium) as related to electrodepositing conditions.**

Over the last several years, the life expectancy of automotive plating has improved 200 to 400 per cent, says Dr. Faust. As a result of research into auto chrome work, it's known that certain properties can be obtained and identified as being important for high quality protection and retention of appearance. The knowledge will also be helpful for aerospace applications.

Platers recently learned how to evaluate ductility in a coating (important for shock loads). Ductility must be evaluated in connection with the several layers of plating in many cases and related to substrate hardness.

Corrosion resistance of the plate metal is not enough. In decorative

Check Points For Plating Jobs

PAY particular attention to:

1. **Properties of the basis metal.**
2. **Surface properties of the basis metal (independent of the rest of the metal).**
3. **Properties of the diffusion alloy of the basis metal and the deposited metal alloy (if it's a high temperature use).**
4. **Properties of the deposited coating.**

To illustrate the points, Battelle's experts used this dramatization.

Dr. Faust: The part is a beryllium sphere about 12 in. in diameter. An electroplate is required to prevent oxidation at about 1100° F. The part is abrasive finished to about 10 microinches rms.

Mr. Beach: What about surface cracks?

Dr. Faust: If the part is cracked, we're wasting money in plating it. The history of the beryllium part is as important as the quality of the electroplate in getting a good product.

Mr. Beach: You can do the job with chromium over a thin copper plate and a thin zinc-copper plate. The intermediate coatings act as bonding materials and prevent the chromium from alloying with the basis metal.

Mr. Safranek: One way to get around chromium brittleness and its tendency to crack is to consider laminations of chromium with some other metal—nickel is a good one. When you heat the lamination (as under service conditions) you diffuse the metals, and the alloy that's formed is better than either metal.

Dr. Faust: Should thermal stability of the electroplates be considered?

Mr. Safranek: A high temperature and low contraction chromium should help provide freedom from cracking. Select a nickel sulfamate solution for maximum dimension stability and minimum change in density and structure.

Mr. Beach: Before releasing the parts, consider a quality control heat treatment to check the bond of the plate.

plating, the plate may not have to withstand severe corrosion, but where the plate is being applied primarily for corrosion protection, the way it is applied, as well as the corrosion resistance of the plate must be known.

Some methods of decorative plating leave tiny cracks or microporosity—no problem for indoor exposure, but under severe conditions, the basis metal may be corroded while the metal of the plate is untouched. Cracking or flaking results. The same metal plated by another process, or with a change in substrate, may give top performance.

All problems can't be solved by increasing the thickness of the plate.

Automakers are still concentrating on troublesome points and are improving the correlation between accelerated corrosion tests and outdoor weathering — especially the ravages of service, comments Mr. Safranek. Another area of special benefits for platers and purchasers will be more information about properties and the property-to-performance relationship.

• High quality and high production are not always compatible.

An electroplater faces the problems of cleaning the surface, questions of plate thickness, and selection of a plating bath. A hurried production schedule sometimes means that contaminated cleaners are not changed. Result: Poor adhesion. If plating solutions are not purified, quality suffers.

Too often, the plater is not cognizant that preparations for plating are really the cheapest part of the operation, says G. R. Schaer. Proper maintenance or preventive maintenance is a necessity.

• Quality control checks and instrumentation can improve quality.

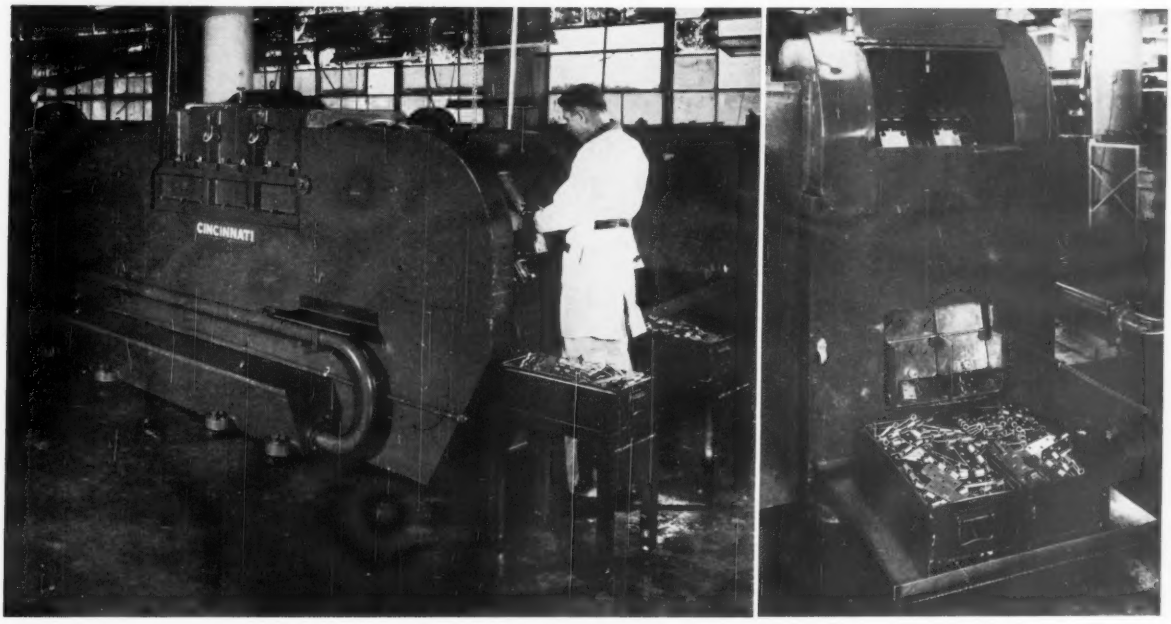
Since plating involves 10, 15, or 20 operations from cleaning to the final coating, each step involves a problem of chemically maintaining proper compositions of solutions and knowing when solutions are in or out of balance.

• Check out processes and material properties.

Chrome plate, for example, can be produced to attain different properties, and so can nickel and other coatings. Some, but not all, nickel plates are suitable for high temperature service, adds Mr. Beach.

Electroplate for high temperature conditions should be thick enough to take care of alloying, corrosion, and erosion. Mr. Schaer reports one instance where wire was nickel plated. Under heat, the coating failed. Reason: A metallurgical cross section showed the nickel had been completely consumed by oxidation. A better job would have required a thicker coating or a different material.

When designing a plate for high temperature conditions, consider the alloying action of the coating and the basis metal and the characteristics of the alloys. Sometimes they're beneficial and sometimes detrimental, cautions Mr. Beach.



Leaves are fed into entry end of chain unit, emerge two at a time . . .

Nonstop Broach Speeds Hinge Production

• THE ACCENT on automation boosts the potential of chain broaching, a method that has been around a long time without going too far, says Cincinnati Milling Machine Co., Cincinnati.

A case in point: Lawrence Bros. Inc., Sterling, Ill., is chain broaching high quality leaves for door hinges. The company used to mill the slots—a method that was versatile, accurate, but too slow. Clamping parts and machining them in the milling machine accounted for most of the lost time.

And slow production hurt. There's not much room for profit between the cost of material and the end price of a door hinge.

• Chain broaching steps up the production of hinge leaves.

At Lawrence Bros., a Cincinnati chain broach is mass producing several sizes of hinges on a continuous cycle. Parts, mounted in fixtures, are fed across tool inserts by the chain. Guideways hold the fixtures in close alignment, so tolerances are easily held.

As the fixtures approach the broaching inserts, they are aligned and supported by bearing strips on each side of the broaching tunnel. A safety interlock stops the machine cycle if a part is incorrectly loaded in the fixtures.

To minimize changeover time, the fixtures are designed so the operator can quickly substitute the locating details in each of the six fixtures. Up to six additional fixtures can be added to the chain, and any fixture can be removed without disconnecting the chain, and the remaining fixtures can continue in service.

• The production rate is fast. On some of the smaller hinges, the broach slots a leaf every 2 seconds. One popular size is turned out at a rate of 924 parts an hour.

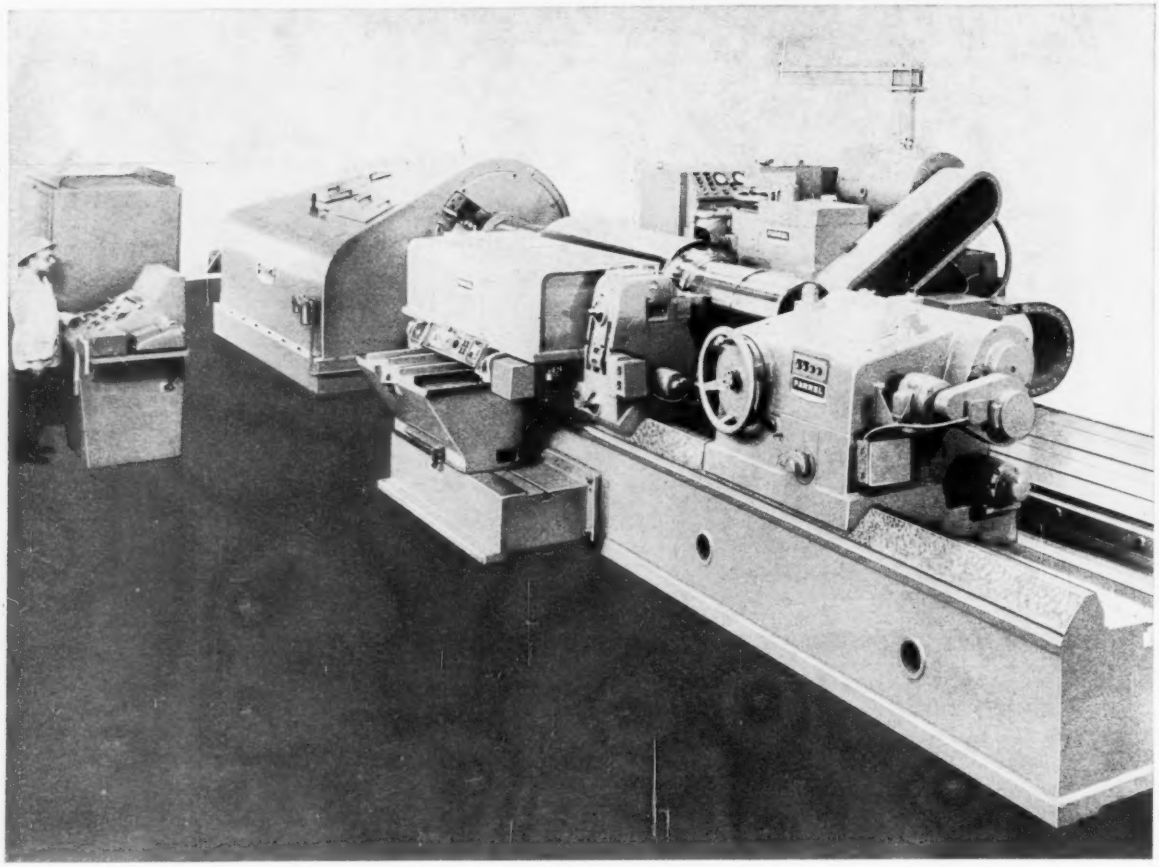
Fixture clamping, broaching, unclamping and unloading are all automatic, contributing to the relatively high production rates. Loading is done by hand, but Cincinnati Milling engineers say it too could be automated.

Chip disposal is also automatic. A pressurized coolant system washes the chips away from the cutting area into a trough at the side of the machine. An endless conveyor at the bottom of the trough carries the chips to a disposal point away from the machine.

• Tool sizes are adjustable; one set of roughing and finishing tools is adaptable to all hinge sizes.

Lawrence Bros. uses two identical sets of tools—one is sharpened while the other is at work. The setup keeps downtime for tool change at a minimum.

The company is getting complete interchangeability of machined parts at higher production rates. And most important, costs have been trimmed to protect the company's ability to make a profit in a highly competitive business.



From a remote console, operator keeps watch as . . .

Punched Tape Guides a Roll Grinder

• **PUNCHED TAPE soon will take over the precision refinishing of steel mill rolls at Great Lakes Steel Corp., Detroit, a subsidiary of National Steel Corp. It's one of the first successful production applications of numerical control to grinding.**

The 60 in., heavy duty roll grinder (made by Farrel-Birmingham Co. Inc., Ansonia, Conn.) will automatically grind straight or crowned rolls up to 5 ft in diameter and will duplicate diameters for pairs of work or backup rolls.

Two important advantages: 1. Numerical control will give extreme repeatable accuracies, permitting mill management to fix and maintain standards for regrind procedures. 2. Rolls should last longer since the stock removed at each regrind is automatically held to a minimum.

• **The machine automatically rough grinds, aligns the workpiece, semi-finish grinds, dresses the wheel, finish grinds, and measures and records the roll size. It's the first of three machines for Great Lakes.**

The control, made by General Electric Co.'s Specialty Control Dept., Waynesboro, Va., initiates 17 machine and control operation sequences as primary functions. It orders four other sequences as secondary functions. It directs two servocontrolled motions, two variable speed motions, a fixed speed motion, and associated devices. It picks any of ten speeds for the machine headstock, carriage, grinding wheel, step infeeds, and continuous infeed rates. It selects any of six combinations of diamond positioning and crossfeed for wheel dressing.

• **Size and contour are guided by probes.**

Three probes are carried on a table on the front side of the machine. Explains Dr. Peter Hold, manager-research and development at Farrel-Birmingham: "The probes not only terminate or control the various phases of the grinding cycle but also perform other functions, like roll alignment and inspection. A probe on the grinding wheel constantly keeps track of the size of the wheel. This intelligence is needed to maintain the dressing diamond in line with the periphery of the wheel and to enable the wheel to approach the work without running into it."

The front probes, set by servo-controls, measure the diameter and profile of the rolls being worked and detect work remaining to be done. Since the center positions of mill rolls normally show greatest wear, the probe table finds the minimum diameter there. To reduce the higher end surfaces of the roll to this diameter, the control first orders a special sequence known as short stroking.

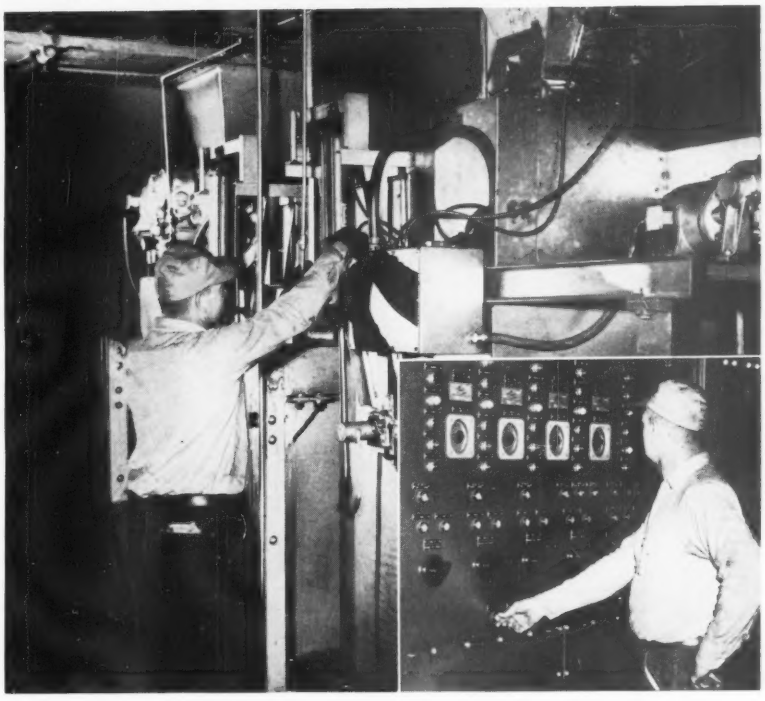
In the short stroking phase, the wheel moves toward the work until the control senses that it has picked up a slight load. That is sensed by detecting variation in amperage of the grinding wheel motor. Then the wheel is traversed to the near end of the roll, steps in as programed, automatically retraces its course until it loses load, and steps in again. That is repeated until automatic checks sense that the end of the roll is within the programed number of thousandths of minimum roll diameter. The wheel then retracts and moves to the other end of the roll to repeat short stroking.

After short stroking of the ends, the roughing cycle is completed by a programed sequence that passes the wheel back and forth across the face until the entire roll is within the preselected tolerance.

The grinding wheel then is diamond dressed (if programed), and finish grinding is made to final tolerance with individual speed changes programed for headstock, wheel, and carriage drives to produce the desired finish.

Special features of the control will match the diameters of both work rolls in a mill stand pair, and will automatically compensate for differences in original diameter and uneven wear.

Weigh hopper at smelting plant is . . .



Controlled from master panel on production floor

Abrasive Dust No Problem For High Accuracy Scales

• IN OPERATION since 1958 without breakdown or downtime . . . is the report on batch weighing equipment at Alcoa's smelting plant in Newburgh, Ind. Accuracy of ±0.1 per cent is expected to be maintained throughout its useful life.

The automatic equipment operates in a building where dry aggregates for carbon anodes are mixed. Abrasive, sootlike fines continually coat all exposed surfaces.

The aggregates are delivered in bulk to rooftop bins directly over a bank of four automatic scales, which are equipped with remote readout and control stations.

• The scales use levers suspended from flexure plates to eliminate wear from the abrasive particles.

The manufacturer (Thayer Scale Corp., Pembroke, Mass.) says the entire weighing system has no wearing parts. Readout systems for the setup include punched tape, printed material, and digital totalizers—the batch process units also have variable control.

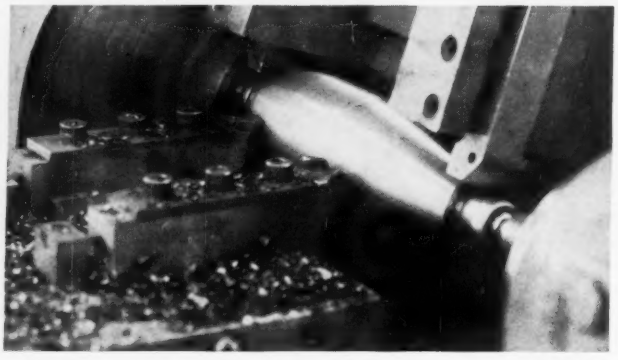
• Each scale handles a different aggregate size that must be precisely proportioned for each formula.

The over-all cycling speed of the system can be varied from the remote control station. The scales are not identical—in a 4 minute batching cycle, capacity is 560 to 1400 lb for the smallest, 2500 to 3500 lb for the largest.

Another Thayer scale is used as an integral part of the conveyor to check the weights of the finished silvery gray anodes. The unit rejects anodes of wrong weight and keeps the cumulative weight of accepted units.

Molded sand cores are one secret of concentric mortar shell bodies . . .

With good ID surface finish . . .



Exterior surface of casting machines easily, quickly

Cast Pearlitic Malleable Gets an Ordnance Break

• A PROCESS has been developed for producing 81 mm mortar and artillery shell bodies from cast, pearlitic malleable iron. It's expected to open a large market for malleable. (Shipment in 1960: 190,000 tons—mostly to automakers.)

Substantial manufacturing economies and superior fragmentation are advantages claimed in the use of the material (a noncritical defense item), say Albion Malleable Iron Co., Albion, Mich., and the U. S. Army Ordnance Special Weapons Ammunition Command, Dover, N. J., codevelopers.

The company has a $935,000 contract to produce 173,000 rounds of 81 mm mortar shell bodies.

• Precision casting, an accurately controlled annealing cycle, and special ultrasonic testing techniques help make the process possible.

Use of the shell core process helped provide part concentricity and uniform wall thickness—important since proper trajectory of a fired shell depends almost entirely on balance and weight distribution. Specifications require an accuracy within thousandths of an inch.

Yield strengths can be accurately controlled from 50,000 to 100,000 psi by varying the annealing process. Formed during annealing is soft ferrite, which contributes toughness and ductility, plus pearlite with its high tensile strength (almost equivalent to annealed steel). The temper carbon (simultaneously dispersed throughout the structure) acts as a solid lubricant to the cutting tool and makes possible high cutting speeds, prolonged tool life, and good machined surface finishes. Close metallurgical control helps assure a strong, easily machinable casting with desired fragmentation upon explosion.

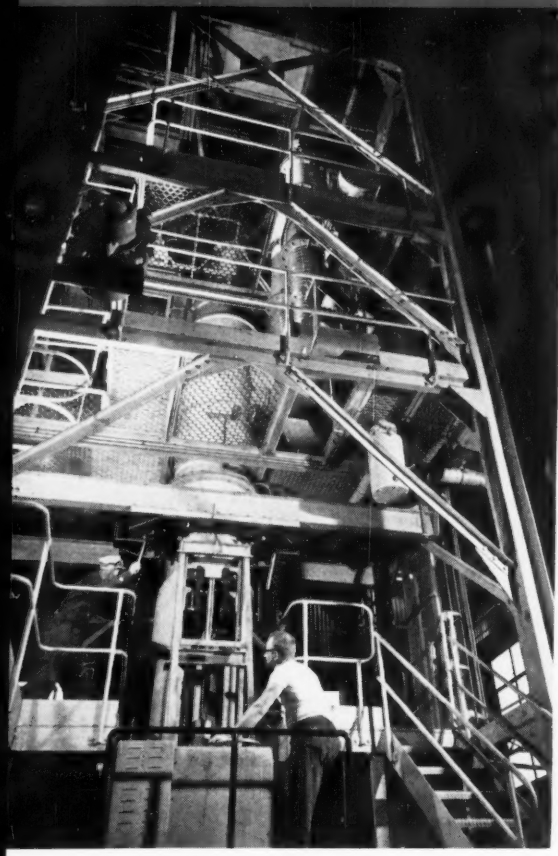
Annealing takes 24 hours compared with more than a week previously. Improved melting control permits the use of a relatively high silicon and low carbon content in the metal to accelerate annealing. That innovation, plus the elimination of large amounts of packing materials and near automation of the annealing furnaces, accounts for the fast heat treating cycle.

To insure safety, a special designed ultrasonic inspection device made by Sperry Products Inc., Danbury, Conn., subsidiary of Howe Sound Co., checks all shell bodies for defects. It uses a lead titanate transducer to generate a mechanical wave (2½ million cps) for that purpose.

VANADIUM-ALLOYS CVM STEELS

CONSUMABLE VACUUM MELTED

"the highest quality money can buy"



On critical applications when only the best will do—specify CVM (Consumable Vacuum Melted) steels and alloys from Vanadium-Alloys Steel Company. Our CVM label is your assurance of unsurpassed quality and purity.

To begin, our steels are melted under stringent tool steel practice in order to insure electrodes of the highest quality and purity. Our versatile vacuum melting furnace, with closely regulated power input, enables us to melt 9½", 12", 16", 20", and 24" ingots at continuous vacuum pressures below one-half of a micron for maximum degassification.

A half-century of experience melting a wide variety of alloys has taught us how to realize the highest structural quality from each composition. Pleased customers regularly report higher physicals and better metallurgical structures with our melts as compared with the same grades produced in other furnaces.

Today, the aircraft and missile industries are enjoying the extra value of CVM steels with their higher strength and improved cleanliness, with subsequent critical weight savings and higher fatigue life. Why not see how CVM can answer your special steel problems? Our sales and metallurgical departments will be pleased to discuss your requirements.

CVM GRADES NOW AVAILABLE

*VascoJet 1000	*8620	304 Stainless
*4150 Modified	*9310	316 Stainless
*4330+V	*A-286	317 Stainless
*4335+V	Inco 901	410 Stainless
*4340	V-57	436 Stainless
*4350	*52100	M-1 High Speed Steel
300 M	*51100	*M-2 High Speed Steel
X-200	*440-C Stainless	*M-10 High Speed Steel
*D6AC	*440-C Modified Stainless	*M-50 High Speed Steel
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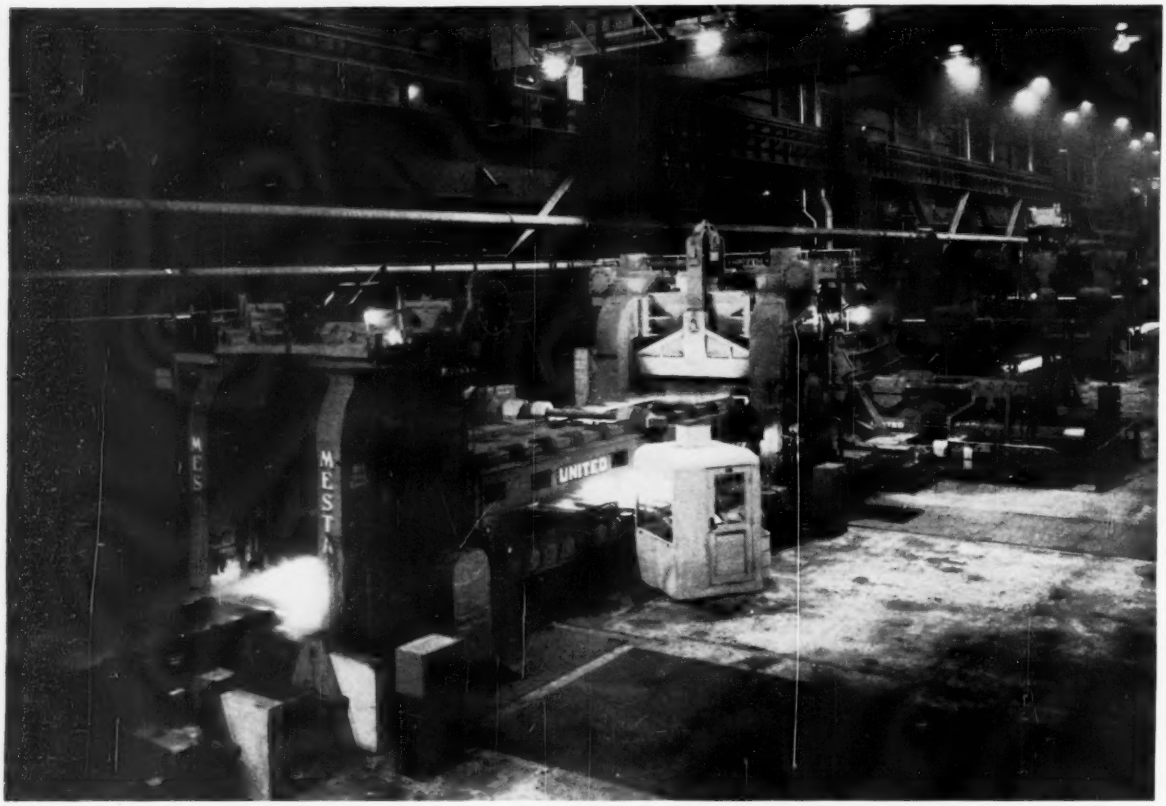

Scale breaker, broadside mill, and roughing stands take larger slabs . . .

Hot Strip Mill Revamped; Rolling Capacity Doubled

• MODERNIZATION of a hot strip mill at the Campbell (Ohio) Works of Youngstown Sheet & Tube Co. more than doubles rolling capacity of the mill, improves product quality, and gives the company better control of production costs. Cost of the project, which was started in late 1958, was more than $60 million, excluding expenditures for a new annealing facility.

The strip mill revamp included enlargement of slab handling equipment and blooming mills at the Campbell and Brier Hill (Youngstown) plants. Continuous pickling lines, conveyors, and coil handling equipment were also enlarged.

• Heavier slabs are handled at higher processing speeds, with larger heating and rolling equipment.

Three slab furnaces heat steel to rolling temperature (2400° F) in 90 minutes. Each furnace is 28 by 100 ft, to accommodate 26 ft slabs available from revamped bloomers. (The slabs weigh up to 20 tons vs. 7 tons for the 15 ft slabs previously available.)

Heated slabs pass through a vertical edger, a scale breaker, and a broadside rolling mill before going into the four roughing stands. Present blooming mill equipment limits strip width to 60 in. in straightaway rolling. But the broadside mill makes it possible to widen slabs before they enter the roughing stands and extends maximum strip width to 72 in. (trimmed).

• Better gage uniformity is maintained with electronic inspection and gage control devices.

Tendency of the strip to run offgage at the tail end of the coil (because the slab cools and hardens as it passes through the mill) is minimized in the six stand finishing train, which was part of the original strip mill. Regulation of cooling water flow helps hold rolling temperature constant. "Tail pulling"—reduction of roll speed,

NEW— Handy Ferroalloy Selector

Here in one compact folder that opens for use as a desk or wall chart, is a complete summary of over 150 grades of ELECTROMET ferroalloys and metals. Each product's chemical analysis is given along with a brief description of its major uses in making better steel, iron, and nonferrous metals.

The folder also gives phone numbers and addresses of Union Carbide Metals' sales, service, and production facilities. Always on call, this nationwide network is just one of the *extra values* you get when you buy ELECTROMET ferroalloys and metals. In addition, you get the latest in ferroalloy technology from Union Carbide Metals' 600-man research and development center, plus help where needed from its metallurgical service engineers who travel more than a million miles a year to provide customer service.

Finally, you get the finest ferroalloys and metals available—the result of the strictest quality control which requires over 100,000 tests per month from mines to shipment. For your copy of the new Ferroalloy Selector . . .

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Please mail promptly my free copy of the "ELECTROMET Ferroalloys and Metals Selector"

NAME_____

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COMPANY_____

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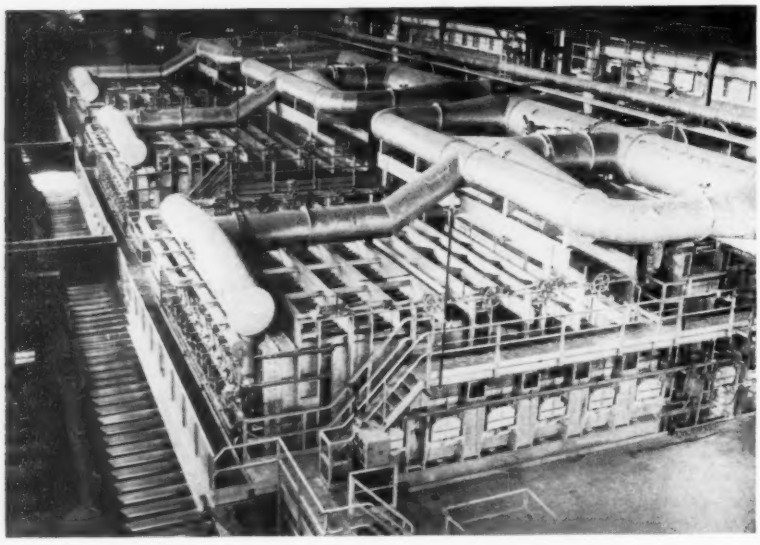
New building, furnaces offer more efficient annealing



Bigger slab heaters boost process tonnage

one stand at a time, as the strip passes through—stretches the back end of the coil and helps hold the strip on gage.

Later, an automatic gage control system will be provided for the mill by Westinghouse Electric Corp. X-ray gages and strain gage load cells will monitor strip thickness and roll pressures on three of the six finishing stands. The system will apply more power to roll motors, and adjust screwdowns to compensate for gage runup on the tail end of the coil.

• **New facilities provide close control of the annealing process and expedite handling of cold strip coils.**

Annealing equipment includes 42, single stack, 75 ton furnaces, four, 300 ton units that take four stacks at a time, and two, open coil furnaces (30 ton capacity), which are used in making single coat enameling steel.

Air Power Speeds Handling Of Open Hearth Materials

A PNEUMATIC system for faster handling of dolomite, lime, and iron ore in open hearth shops has been developed by Blaw-Knox Co., Pittsburgh. A prototype of the system, fabricated at the firm's Blawnox (Pa.) plant, employs storage bins that meter material to activators, or pressure vessels, at the upper furnace level. Each activator is designed to serve two furnaces.

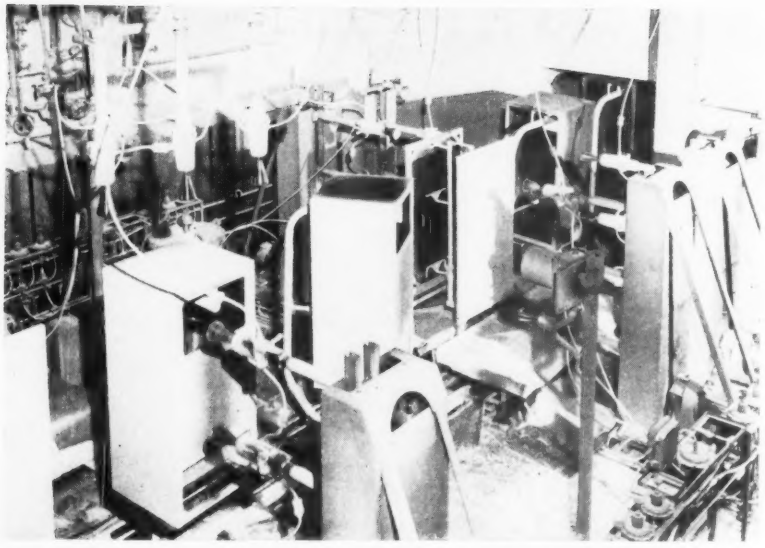
Gravity and low pressure blowers move material from storage bins at the lower furnace level, through pneumatic conveyor lines and into cyclone receivers on the charging floor. Ore and lime are pressure fed into the bath, through lances. Cyclone design of the receivers, which can vary in diameter and depth, causes dolomite to fall through a swivel spout to a patented throwing mechanism. Dust problems are said to be eliminated.

The throwing mechanism is said to apply dolomite with just enough force to secure it to the furnace wall —without spraying and breaking the refractory material. That counteracts erosion and maintains adequate wall thickness during the heat. Hoppers hold enough material for one furnace makeup. Indicators show when cyclone receiver stations must be refilled.

The system clears the charging floor of material and handling equipment. And it frees hot metal cranes for other duty. Air power moves the hopper and throwing mechanism along an overhead monorail at speeds up to 176 ft a minute. The unit is elevated after use, to provide adequate walking clearance.

Glass Used as Lubricant To Extrude Carbon Steel

GLASS will be used as an extrusion lubricant in the manufacture of carbon steel tubing. Lorraine-Escaut will employ the method at a plant in Anzin, France. Previously, the process was limited to alloy and stainless steel tubing and shapes. Lorraine-Escaut obtained a license from Cefilac, a subsidiary of Ugine, French electrometallurgical company.



More refrigerator doors, cabinets finished as . . .

Electrostatic Paint Setup Accommodates Mixed Sizes

• FOUR WAY positioning devices for bell atomizers and automatic paint triggering made possible the electrostatic painting of mixed sized refrigerator doors and cabinets on the same line.

As a result, American Motors Corp.'s Appliance Div. plant at Grand Rapids, Mich., reports improved finish, paint mileage, and lowered labor costs. Rejects, formerly a major problem, have been virtually eliminated.

Production requirements ruled out the use of the reciprocating disk technique for paint application. More flexibility was needed to accommodate mixed sizes of cabinets and doors on the line at the same time.

Ransburg Electro-Coating Corp., Indianapolis, suggested a moving bell setup with automatic controls for paint triggering and repositioning. Coating on the parts is maintained at a uniform 1.8 to 1.9 mils regardless of size variation.

• Sides of the cabinet shells and doors are painted at the first station equipped with four reciprocating units, two on each side of the line.

Each unit has three atomizing bells mounted in a vertical line, one above the other. The 4 in. bells, rotating at 900 rpm, move up and down and back and forth to maintain the proper painting distance (about 13 in.). The bells are controlled by limit switches. Paint is turned on and off by electric eyes.

• As the cabinets move toward the second station, they're indexed by a dolly system.

Doors are not indexed, but go straight through the line. At the second station, cabinet backs are painted by a three bell unit.

Three overhead stationary bells apply the first coating to cabinet tops. After a short flash off, other units apply another coat.

• Before entering the final station (identical to No. 1), cabinets are indexed to the original position for another coating on the sides.

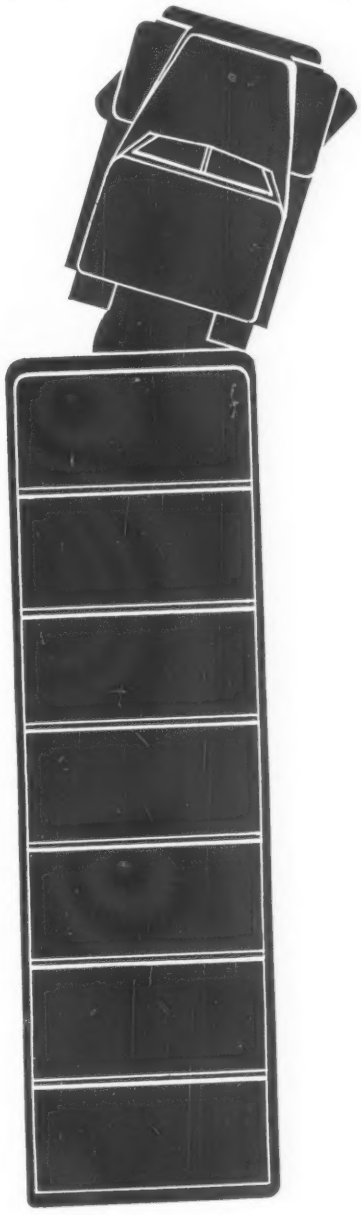
Hand touchup finishes the job. The parts are baked at 305° F for 30 minutes.

Look Ahead...

. . . for an example of Allegheny Stainless at work in a specific market application, featuring the fabricated products of Allegheny Ludlum customers.

Check the next two pages which also appear in the current issues of FLEET OWNER, COMMERCIAL CAR JOURNAL, AUTOMOTIVE NEWS, and TRANSPORT TOPICS.

It's just another case of how Allegheny Stainless can work for you . . . in your products . . . in your markets . . . in your merchandising efforts.



Fruehauf's Stainless Steel Trailer is ahead by a country mile

New price reductions promise even more stainless units on the roads

Advanced engineering and manufacturing techniques in the production of the premium semi-trailer on the highway today . . . Fruehauf Stainless Steel Vans . . . have made possible reduced prices on the line. This news is being welcomed by fleet owners and operators everywhere.

Fleet operators have replaced trailers made of other than stainless steel several times over while their stainless units have kept delivering payload with virtually no exterior maintenance. These operators have records full of evidence of the value of stainless trailers and their acceptance of the new price announcement is most enthusiastic.

Perhaps even more interested should be the people who have heard of the better values in stainless trailers but who have

been stopped by the high premium charged for the best.

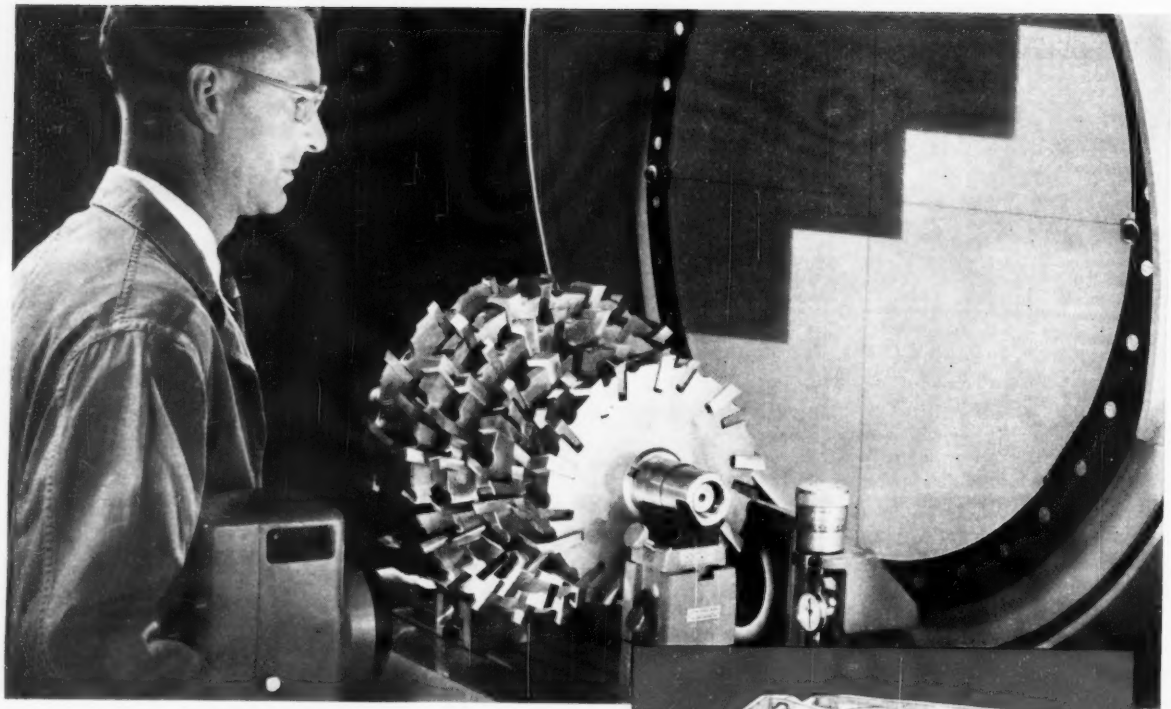
Fruehauf's new prices now bring stainless trailers within a few percent of the cost of trailers built of other materials. The stainless unit provides even greater hauling profits, combining increased strength and capacity with added years of almost maintenance-free durability.

The new lower prices just announced by Fruehauf were a result of their continual, extensive cost reduction program. Allegheny Ludlum, as the major stainless steel supplier, worked right along with the Fruehauf engineers and production men on this program.

A-L research and application engineers are at your service, too, for counsel on fabrication techniques and the economical use of Allegheny Stainless in your product. *Allegheny Ludlum Steel Corporation, Dept. MID 2, Oliver Building, Pittsburgh 22, Pennsylvania.*

3300

ALLEGHENY LUDLUM



Built by EX-CELL-O

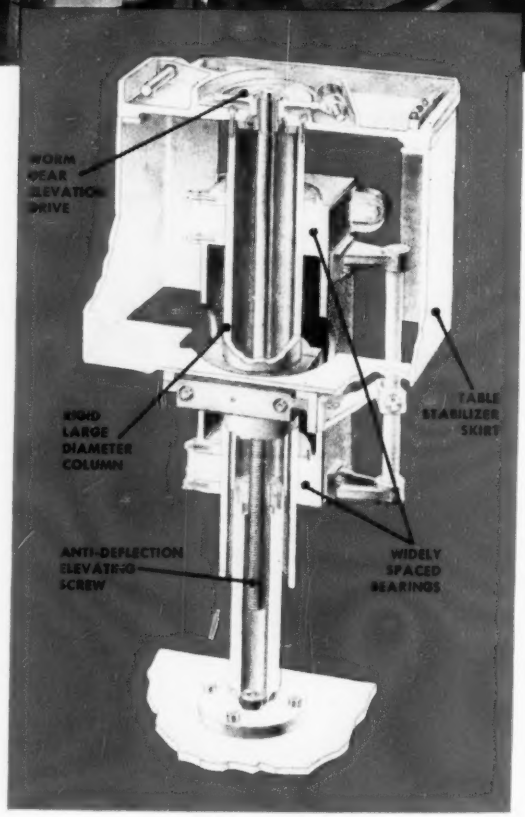
To Insure Accuracy

Rugged, precision construction of Ex-Cell-O Contour Projectors results in stable support for the optical systems providing accuracy in the order of .0001". This rigidity is a major consideration in achieving for Ex-Cell-O Projectors an outstanding record of trouble free operation and almost total elimination of down time.

Typical of the sturdy, precision workmanship to be found throughout Ex-Cell-O Contour Projectors is the worktable of the Model 14-5 and Model 30. Engineers will recognize the superior design features shown in the inset at right. To cite just a few, the large 5" O.D. columns, supported in widely spaced bearings; the heavy channel skirt to stabilize the table assembly and the flexible elevating screw which can't impart deflections to the column.

Because of these construction features Ex-Cell-O Contour Projectors support heavy loads firmly, yet move easily and smoothly.

Whether your problem involves receiving, production or final inspection there's an Ex-Cell-O Contour Projector to do the job accurately, quickly and at low cost. The "why" and "how" is condensed in our new booklet—"43 Reasons Why Ex-Cell-O Contour Projectors are the First Choice of Industry." Yours for the asking!



Manufactured by EX-CELL-O Corporation at Detroit, Mich.

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OPTICAL GAGING PRODUCTS, INC.

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Subsidiary of EX-CELL-O Corporation

New Carbide Put on Market

• Union Steam Pump Co., Battle Creek, Mich., is using titanium carbide tool bits for milling 300 and 400 Series stainless steels at 1900 surface feet per minute. Metal is removed at 30 cu in. a minute.

• An operation on 1118 steel at Saginaw Steering Gear Div., General Motors Corp., runs at 1100 sfpm with 0.0025 in. feed. Titanium carbide cutters are averaging 550 pieces per grind. With the former setup, conventional carbides averaged 340 parts per grind.

• On the finish boring of an SAE 5135 steel gear blank at 300 sfpm, conventional carbides produced an average of 60 pieces; titanium carbide turned out as many as 750 pieces per grind. The job's at Dana Industries, Toledo, Ohio.

• THE TITANIUM CARBIDE that showed its mettle on those jobs is the one that Ford Motor Co. announced two years ago. (STEEL, Mar. 16, 1959, p. 62.) Now, Vascoloy-Ramet Corp., Waukegan, Ill., has been granted the first license to manufacture and market the material (VR-65).

Field proved applications include: Machining automotive brake drums and transmission parts, missile bodies, steel mill rolls, large implement gear blanks and flywheels, and a variety of shafts.

Vascoloy-Ramet reports that the material works on most steels, including stainless, and cast iron.

• Higher speeds have produced better surface finishes.

Because the material will stand up under temperatures generated by higher cutting speeds, some jobs have shown a benefit in improved finish. For example, a 316 stainless steel part has been run at 0.0006 in. feed, 0.003 in. depth of cut, and 760 sfpm, with a resultant surface finish of only 3 to 5 microinches rms.

Vascoloy-Ramet also claims that superior edge wear and crater resistance of VR-65 can be credited with better size control on some parts. Example: 350 SAE 8615 steel gear blanks are machined to prescribed tolerances without any adjustment of the titanium carbide cutter. With conventional carbide, the operator had to adjust the cutter every 25 pieces to maintain accuracy.

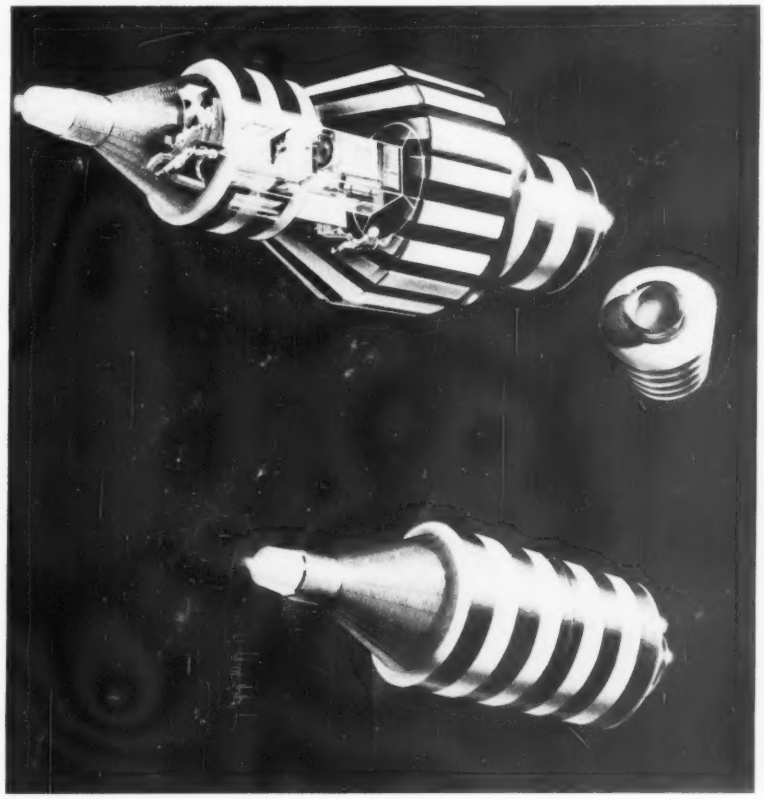
• Both inserts and brazed blanks will be marketed.

The company will make both negative and positive rake mechanically held inserts, plus blanks for brazing to steel shanks and single point tools.

Tool geometry can be the same as that used on conventional carbide tools, but when the tools are applied to severely rough or interrupted cuts, strengthening of the cutting edge by negative rake angles is said to be beneficial.

The material can be ground on diamond wheels with the same practices used for harder tungsten carbide grades.

The company says it has machined parts with interrupted cuts, and the material has been used for milling — usually with good tool life, good metal removal rates, and good surface finish.

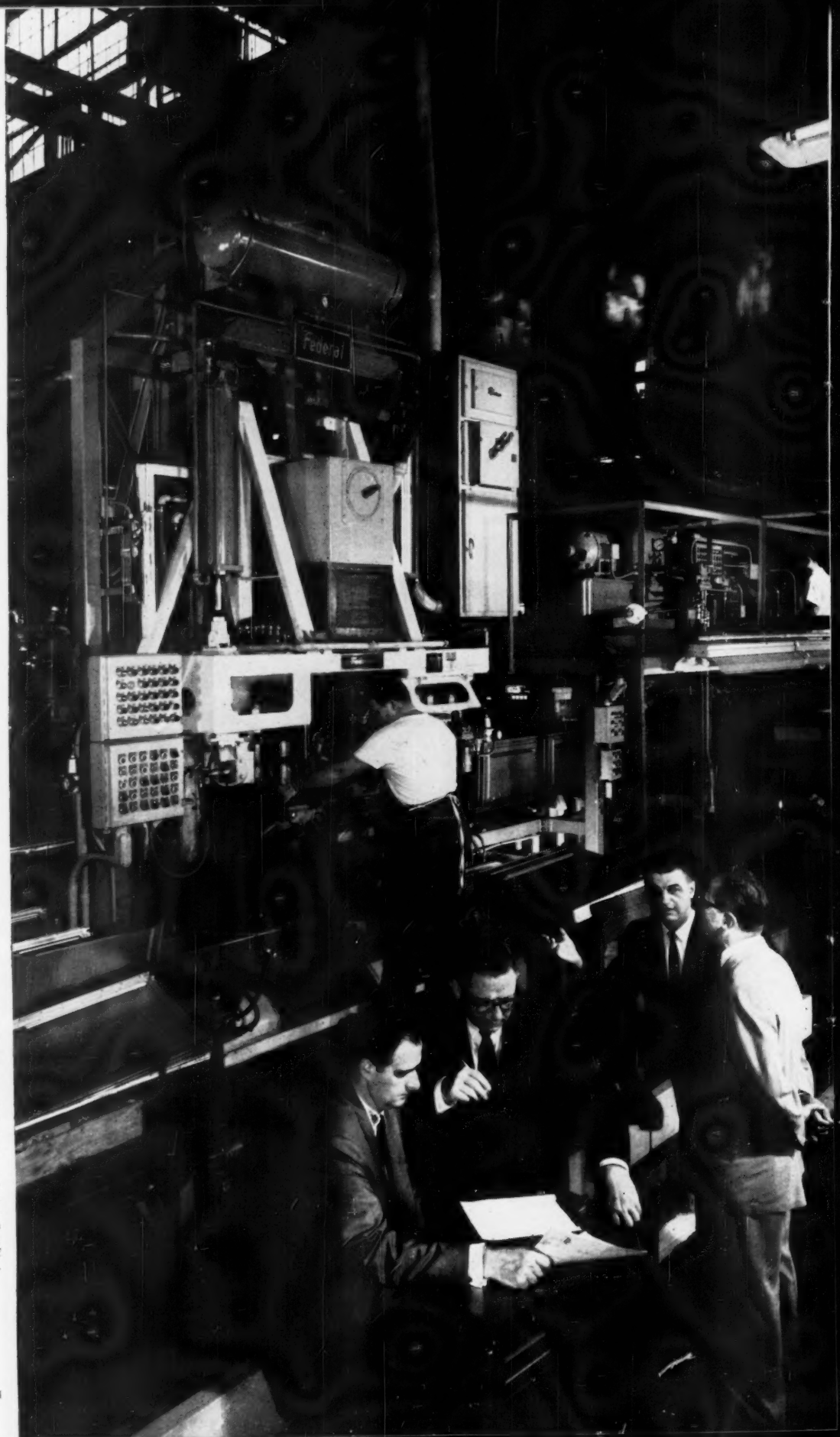


Space Vehicle Designs Shown by Ford

MULTIUNIT space vehicles are being designed by the Aeronutronic Div., Newport Beach, Calif., Ford Motor Co., to accomplish a wide variety of tasks.

A typical space train, says Ford, might have a command post up front capable of returning astronauts to earth. A propulsion unit at the center would permit orbital corrections and retro-thrusts for earth landings. At the rear, a detachable living or laboratory "car" would permit some maneuvering in space.

Three structural types are being investigated: Pressure stabilized membranes, rigid panel inflatable structures (shingles), and telescoping units.

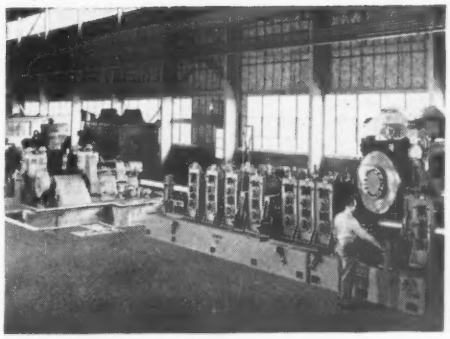


Federal Welding Line at Whirlpool's Evansville, Indiana, refrigerator plant automatically forms and welds together complete food liner shells at a rate of 200 per hour. Here, F. A. Bodenheim, Jr., manager of welder sales for McKay's Federal-Warco Division, goes over latest production charts with H. J. Muehlbauer, director of manufacturing engineering for Whirlpool, as Robert Bussell, sales representative for Federal-Warco, discusses operations with Gene Rommel, general superintendent of tooling for Whirlpool.

Photo by ARNOLD NEWMAN

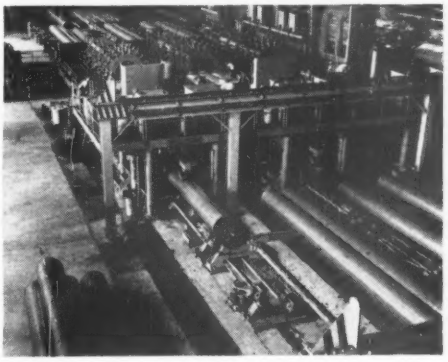
A completely integrated plant . . . a single source of supply . . . one area of responsibility! A new idea? Not really, but an idea that's not easy to bring to reality. McKay Machine has done it for metal fabricators, designing and building equipment to volume produce parts or entire units from raw steel to finished product. ***This is McKay Machine*** We know steel handling . . . we've been designing uncoilers and coil-handling equipment for 30 years. McKay Machine knows welding because the highly respected names of Federal Welder and Berkeley-Davis are now a part of our company. We know processing and forming . . . McKay levelers, tube mills, and cold roll forming machines have been specified by leading industrial firms for more than two decades. And McKay Machine knows stamping, as the Warco Press name testifies. McKay builds the industry's most popular shearing and slitting equipment. Only McKay Machine designs and builds all the components for a truly integrated production line. If you are one of the hundreds of manufacturers who must shave production and handling costs to successfully compete, McKay Machine should interest you. If we do, let us know and we'll meet with you at your convenience. *The McKay Machine Company, Youngstown 1, Ohio.*

McKAY MACHINE



McKay Tube Mills and roll forming machines are considered among the best engineered in the world.

Warco Presses can be found in the leading automotive, appliance and aircraft plants . . . wherever stamping is a major operation.



Berkeley-Davis Fusion Welding Lines, such as the huge installation above, are used by an ever-increasing number of leading steel fabricators.

Photo by ARNOLD NEWMAN

On these large crankshafts, forging firm reports . . .

Induction Unit Cuts Heating Time

• HEATING of crankshaft ends takes only about one-quarter of the time consumed previously since installation of 60 cycle, induction heating equipment at the Park Drop Forge Co., Cleveland. Other advantages include closer control, and reduced scale which eases cleaning problems and cuts die wear.

The six station line has a power rating of 1000 kw, operates from a 440 volt, 3 phase line. It was built by Tocco Div., Ohio Crankshaft Co., Cleveland.

Park Drop Forge turns out the crankshafts for locomotive or marine diesel engines. They are produced from carbon or alloy steel as specified by the customer, and in differing sizes. The 60 cycle equipment helps in getting through heating in larger sizes and a wider range.

No coil change is needed for diameters from 8 to 12 in.

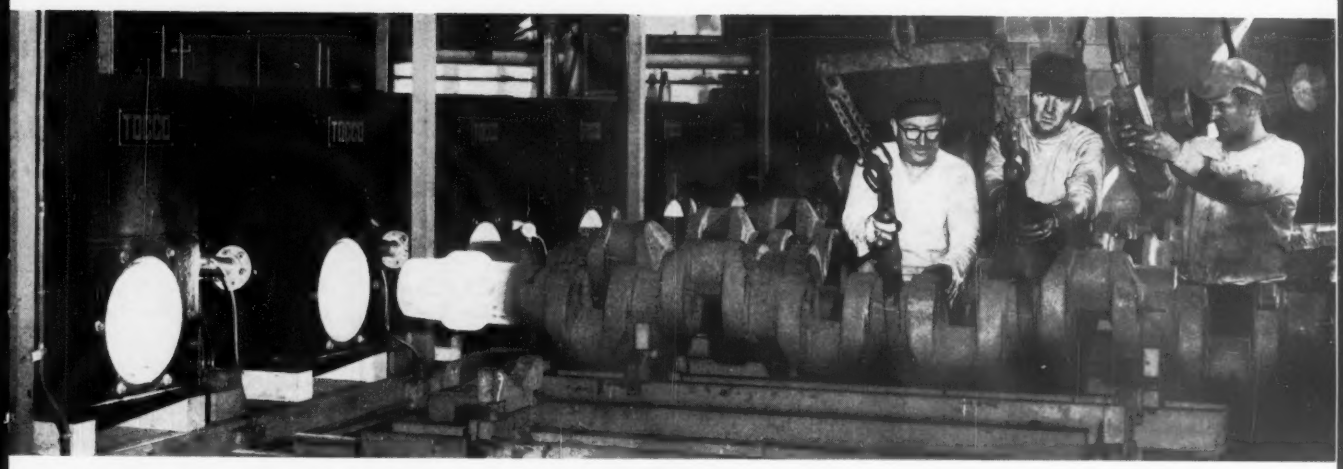
• Each station will heat a 12 in. diameter shaft end to upsetting temperature in 22 minutes.

Previous equipment had been slot type, oil fired furnaces. In those units, heating time had been about 1½ hours; some jobs took as much as 2 hours. The large shafts are heated to 2200° F for a distance of 14 in. before being upset to form end flanges. Crankshafts processed by Park Drop Forge may weigh as much as 4000 lb; largest handled through the Tocco unit so far have been 3600 lb.

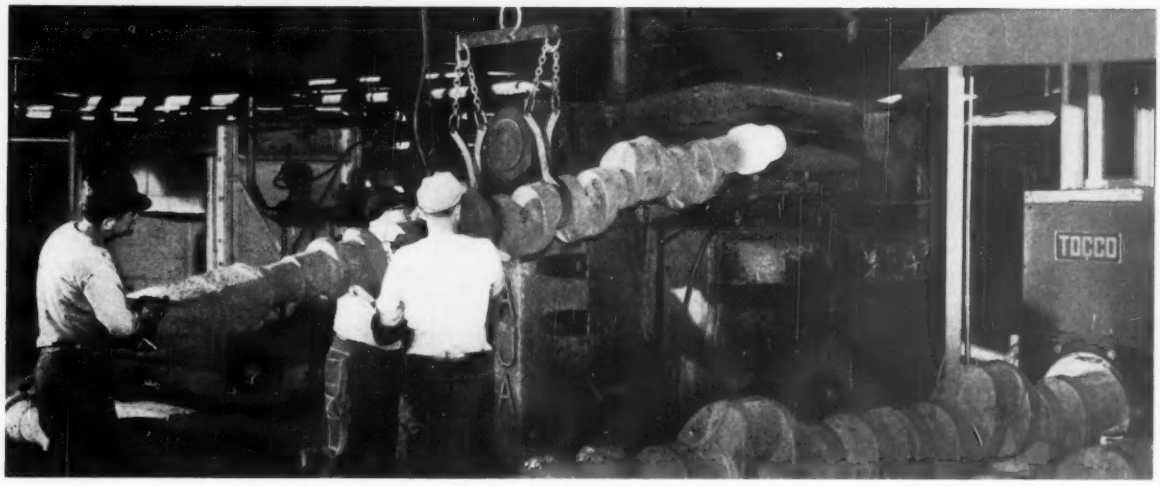
With an over-all heating cycle of 22 minutes for each station, the line will ready a crankshaft for the upsetter every 3½ minutes. The 22 minute cycle, compared with 1½ hours formerly, means a saving of 76 per cent in heating time.

• Induction heating permits close control of temperature.

An optical sensing head is mounted at each station. It sights on the work through the side wall, so is



Using six heating stations, totaling 1000 kw . . .



. . . one crankshaft can be transferred to upsetter every 3-1/2 minutes

out of the way and not likely to be damaged. The signal goes to a recorder controller which provides a written record of each shaft; an observer checks the operation on a regular basis to back up the automatic control system.

Coils at each station are 26 in. long, 15 in. in internal diameter. The 82 turn coils are shielded by ceramic insulation.

Heating through the section is uniform, Park reports. And the automatic operation of the heating units, with individual control of each shaft, permits improved metallurgical control as well as increased production.

• **Scale formation is reduced, and startup time is shortened.**

Continued holding at high temperatures increases scale formation. So the short heating time of the induction units has reduced scaling. In turn, the reduced scale has cut wear on the upsetting dies, which are costly to replace, and made cleaning up for subsequent machining easier. The light scale formed, Park observes, is flaky and easier to remove; it's particularly noticeable in sections with re-entrant angles.

Rapid heating is important too in the event of a temporary delay or shutdown. With less work in the heating furnaces because of the shorter cycle, scale loss is less if forging must be stopped temporarily. There is no need for warm-up time; the induction units will heat at full capacity as soon as they are turned on.

• **The change has improved working conditions and scheduling.**

Park says much better working conditions have resulted from the absence of exhaust gases and the reduction in radiant heat except from the crankshafts themselves. And the shortening of the heating time with improved control has not only aided scheduling, but permitted better use of manpower.

Reliance develops first line of solid state regulators for variable speed drives

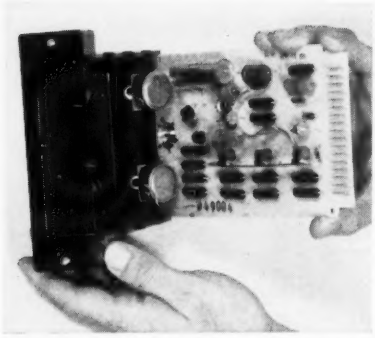
. . . gives you better circuits, precise control, less maintenance.

Reliance has produced the first complete line of solid state regulators and exciters for variable speed (V★S) drives and Engineered Drive Systems. These new devices, using power silicon rectifiers and diodes in place of tubes, achieve precise motor control, 1/10% regulation at base speed, with response times up to twice as fast as tube-type regulators. Here is a major advance in variable speed control, and a major advantage for the industrial user. Reliance Drives with these new regulators are now available to you in 1 to 1500 horsepower.

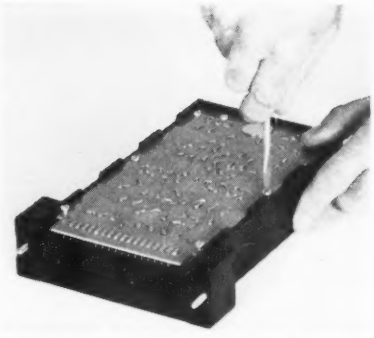
Reliance research and development brings you a more efficient drive than ever before . . . and a notable refinement of already well-engineered systems.

The pictures on the facing page tell the story.

RELIANCE...builders of the tools of automation

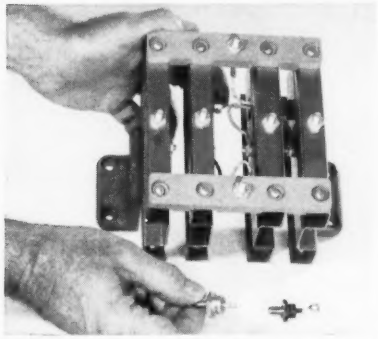


1. Heart of the system is new "Cardpak" control circuit, with transistors, capacitors and resistors to amplify feed-back signals.

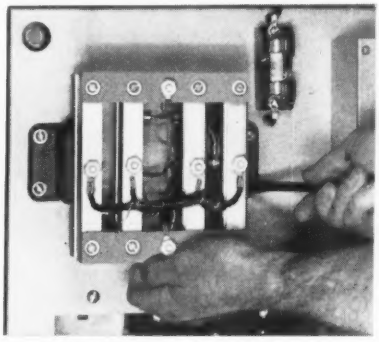


2. Each plug-in "Cardpak" module is a complete control circuit...can be quickly checked and easily replaced, if ever necessary.

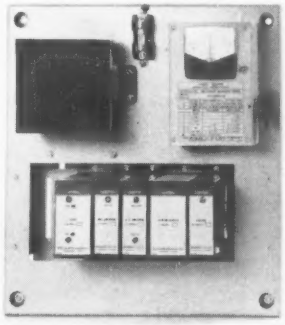
3. Each V★S Drive control system is tailored to your specific job . . . with "Cardpak "circuits pre-engineered for reliability, fast delivery.



4. Power silicon controlled rectifiers and diodes, instead of tubes, are among the most reliable components yet devised.

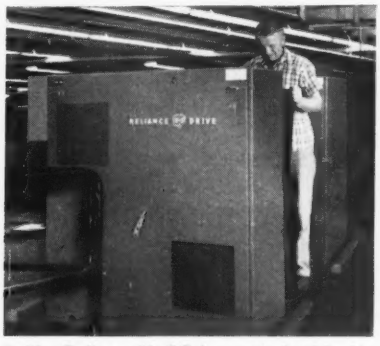


5. The rectifiers, mounted on copper plates for heat radiation, operate over a wide temperature range with no special cooling.



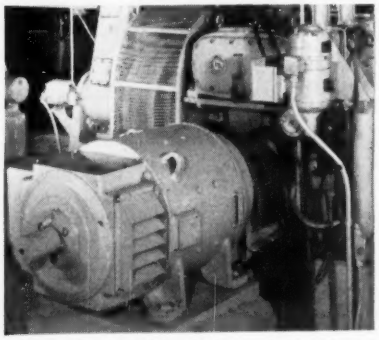
6. Complete panel can be checked quickly for start-up and trouble shooting with the optional test fixture . . . one meter, one knob.

7. Motor control is precise . . . 1/10% regulation at base speed, with response times up to twice as fast as tube type regulators.



8. The Reliance V★S Drive control cabinet is 35% smaller than conventional drives. Cabinet can be located where convenient.

9. Operator's station centralizes drive operation. Multiple stations, bench boards, pendent stations and special controls available.



10. The Super-T D-c. Motor . . . integral part of the V★S Drive. It's rugged . . . absorbs repeated 100% overloads for one full minute.

Your nearest Reliance Systems Engineer will give you all the facts . . . help you apply Reliance V★S Drives to your products and processes. Call him through the Yellow Pages, or write us direct.

A-1689

RELIANCE ELECTRIC AND ENGINEERING CO.

DEPT. 4-7, CLEVELAND 17, OHIO • Canadian Division: Toronto, Ont.

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MALLEABLE

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Alloy Foundries Division, The Eastern Co., Naugatuck

ILLINOIS
Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Iron Works, Moline
Moline Malleable Iron Co., St. Charles
National Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Albion Malleable Iron Company, Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Castings Co., Indianapolis 22

IOWA
Iowa Malleable Iron Co., Fairfield

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

MICHIGAN
Albion Malleable Iron Co., Albion
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Cadillac Malleable Iron Co., Cadillac
Central Fdry. Div., Gen. Motors, Saginaw

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Laconia Malleable Iron Co., Laconia

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Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
National Castings Co., Cleveland 6

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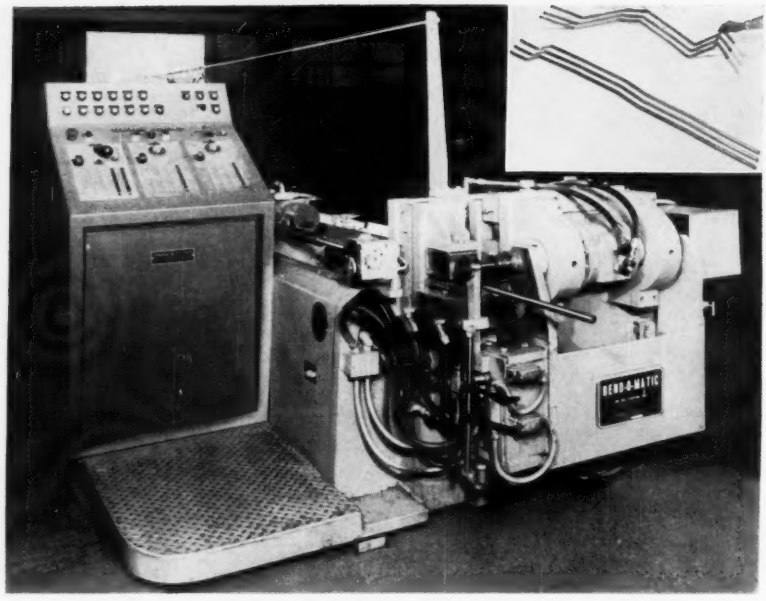
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

These companies are members of the Malleable Castings Council



Versatility, accuracy emphasized as . . .

Punched Tape Controls Tube Bending Machine

• A NUMERICALLY controlled machine designed to bend aircraft and missile tubing up to 1¼ in. in diameter and 8 ft long has a number of other possible applications, says the developer, Nu-Era Gear Corp., Rochester, Mich.

The machine was designed and built by Walter P. Hill Inc., Detroit.

It is equipped with General Electric tape controls.

Bend and twist angles can be held to tolerances of ±1/20 of a degree and distance between bends to ±0.005 in. The unit can handle a variety of tubes of different tempers without springback. Set-up time is about 35 minutes against an average of 4 hours for conventional benders, estimates Nu-Era. The company introduced a similar machine for bending exhaust tailpipes last year (STEEL, Feb. 1, 1960, p. 98).

• Possible applications include bending of reinforcing rods for the construction industry, tubular furniture operations, and various electrical and plumbing installations in the building field, says Phillip S. Chapnick, Nu-Era's president.

Existing dies from any standard, conventional bending machine can be accommodated. Adapter blocks are provided that will fit any existing bending tooling.

In operation, a section of prototype tubing is hand formed to shape. Distances between bends, degrees of bend, and angles of twist are measured and their numerical values punched into the initial control tape. As the machine makes the first part, it also punches a tape that can then be used to produce as many parts as necessary.

Addition of a tape writer and reader to conventional tube bending equipment is said to eliminate the need for maintaining costly fixture inventories for replacement parts for aircraft tubing.

Post-Forming: New Way to Bigger Savings with Malleable Castings

The ductility of Malleable iron castings permits use of high-speed forming techniques to finish Malleable parts at lower cost. Take advantage of the versatility you get only with ferritic and pearlitic Malleable castings. For a fuller understanding of how Malleable can help you, call any producer that displays this symbol —

Free Folder describing these techniques is available for your use. Just ask any member of the Malleable Castings Council for Data Unit No. 116, or write to Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.

MEMBER
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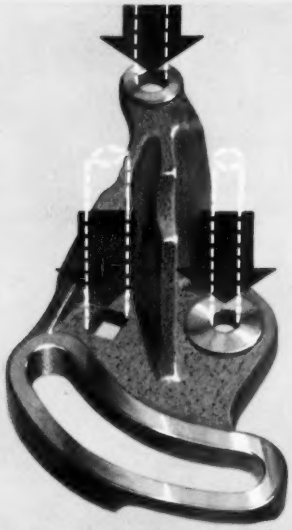
CASTINGS COUNCIL

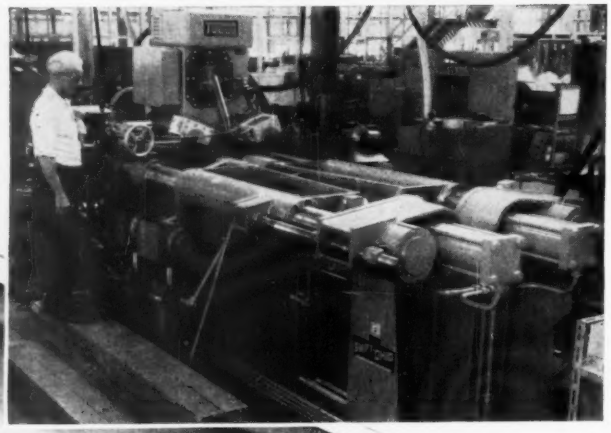
Hot Form It — Hot coining this Malleable transmission part reduces finished cost . . . eliminates three cutting operations required by the previously used steel part.

Roll It — Oil grooves in lawnmower crankshafts and splines in compressor crankshafts are just two of many places where rolling proves more economical than machining.

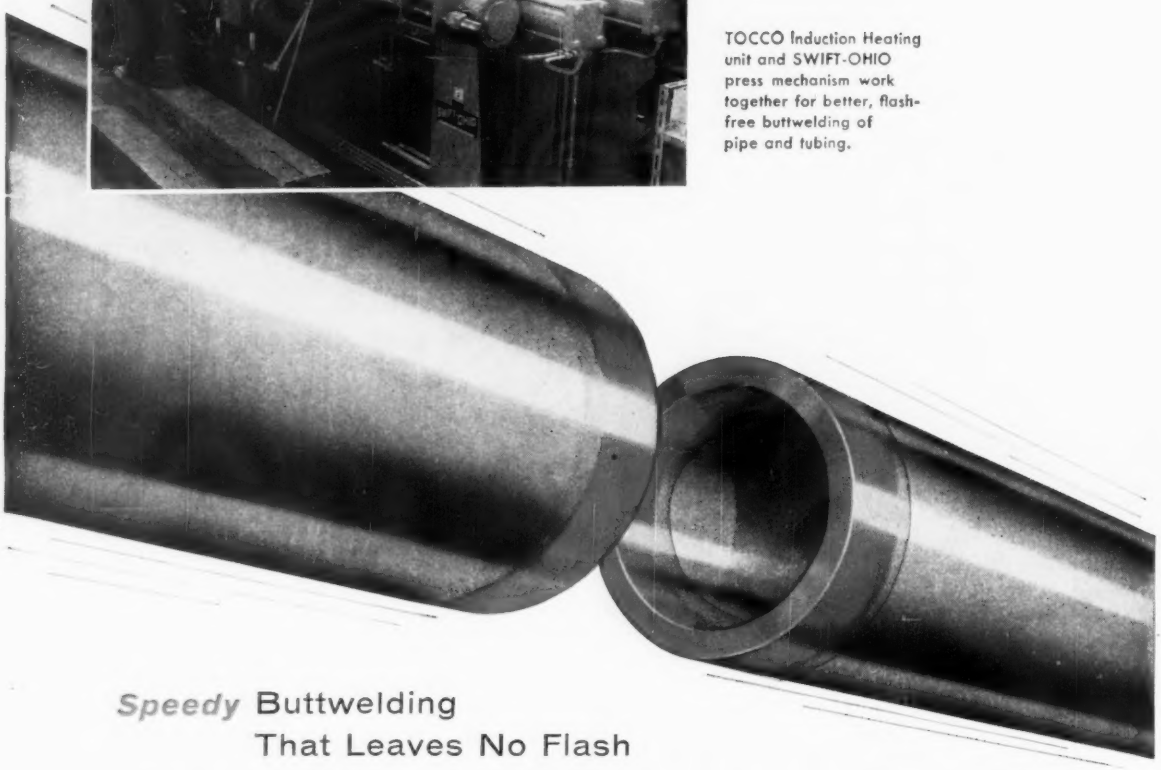


Punch It — Holes with diameters greater than the thickness of the metal can be punched in Malleable. Two round holes and a square hole are punched simultaneously in this idler arm.

Spin It — Malleable's ductility permits the sleeve and end disc in this ball joint to be held in place by spinning the Malleable housing into a strong, permanent flange.



TOCCO Induction Heating unit and SWIFT-OHIO press mechanism work together for better, flash-free buttwelding of pipe and tubing.



Speedy Buttwelding That Leaves No Flash

with TOCCO* *Induction Heating*

Now, in less than a minute you can get flash-free, smooth joints on any size pipe, regardless of its diameter or wall thickness.

Conventional buttwelding methods produce strong, sound joints but leave a brittle flash inside or outside the pipe. Inside flash can seriously impede fluid flow. Particularly on long lengths of pipe, removal of this inside flash is a real production headache—time consuming and expensive.

Whether *your* production bottleneck involves buttwelding, soldering, brazing, heat treating or forging, it pays you to investigate TOCCO as an economical way to do it better, faster and at lower cost.

THE OHIO CRANKSHAFT COMPANY

Mail Coupon Today—**NEW FREE Bulletin**

The Ohio Crankshaft Co. • Dept. S-7, Cleveland 5, Ohio

Please send reprint of article from STEEL Magazine entitled "Buttwelder Leaves No Flash".

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Setup Duplicates, Compares Punched Tapes

EASE AND reliability in duplicating and comparing 5, 6, 7, or 8 bit codes automatically are provided by this tape-to-tape regeneration comparator system. Two motorized tape readers connected with a motorized tape punch help insure accurate, fast verification and duplication of tapes punched by Flexowriter's automatic writing machine (shown in the foreground) or by other tape producing machines.

In numerical control systems application, a tape duplicated from one that has been in use for some time is compared with the original. Each is placed in a reader and read simultaneously at 1200 codes per minute. When an error is detected in the new tape, the reader stops and indicates the error's position.

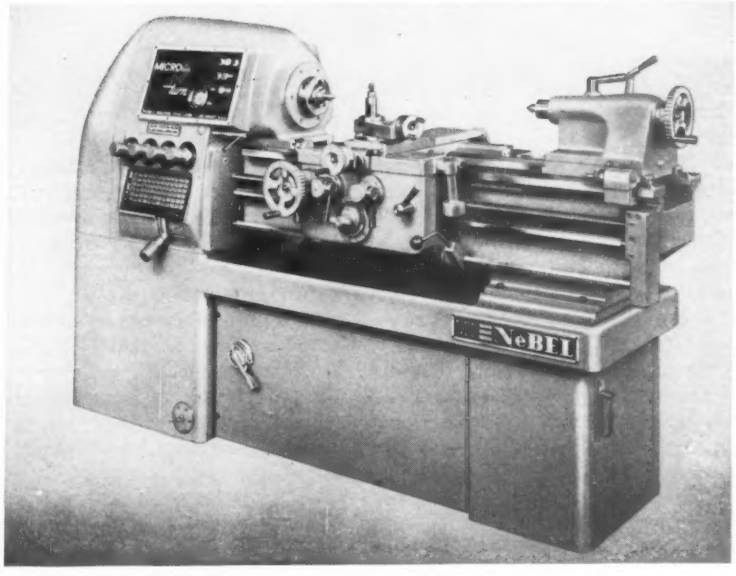
For further information, *write* Promotion Planning Dept., Friden Inc., 97 Humboldt St., Rochester 2, N. Y.

Lathe Has Constant Horsepower at All Speeds

INFINITELY variable spindle speeds with constant horsepower are featured on a high speed precision lathe (Micro-Turn) improved by Nebel.

A mechanical speed variator drive unit and a coaxial spindle design help provide an infinite selection of spindle speeds throughout a continuous range from 43 to 3500 rpm. Output speed is maintained within 0.2 per cent. A built-in torque response mechanism in the main drive prevents slippage under starting or shock loads.

In the low speed range (up to 400 rpm), the lathe operates through a planetary gear unit. In the high speed range (above 400 rpm), headstock coaxial sections lock into a single unit and the lathe operates without gearing through



NEW PRODUCTS and equipment

matched multiple V-belts (directly from main drive to spindle).

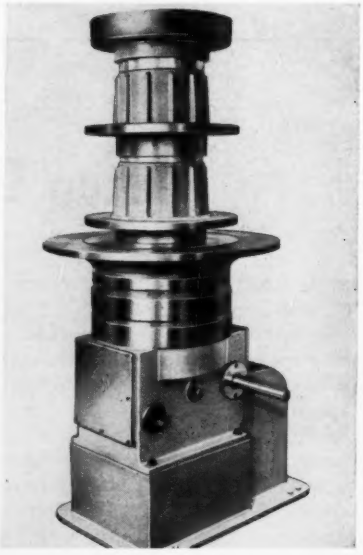
Shifts between high and low speed ranges can be made while the spindle is rotating or stationary. Pushbuttons control spindle speed. A direct reading tachometer is provided. A pressure lubricated gear box provides 60 thread and 60 feed changes.

For further information, *write* Lathe Div., Nebel Machine Tool Corp., 3406 Central Parkway, Cincinnati 25, Ohio.

Turret Indexing Designed For Sequential Assembly

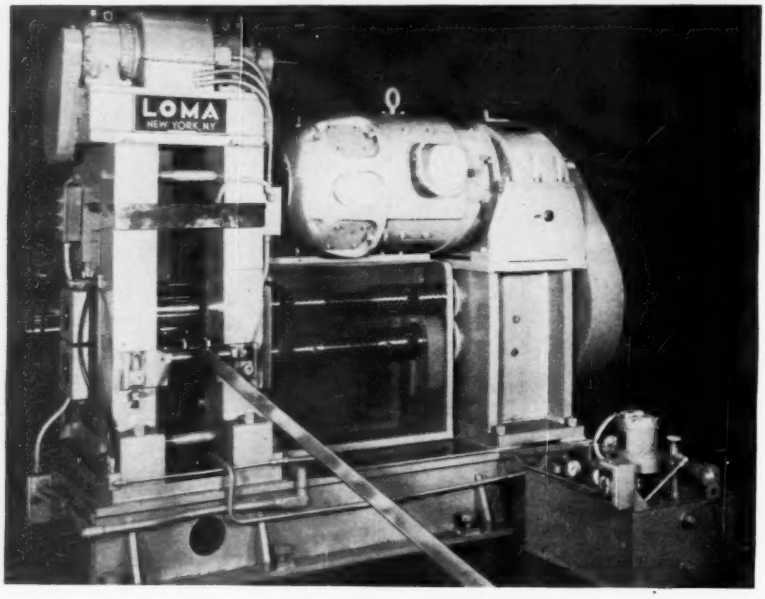
SEQUENTIAL assembling and processing can be done at high speed with the Model SD, Swanson-Erie, turret indexing machine chassis. It's available in a wide range of turret diameters, index positions, and work cycles.

It uses double, overhead tool plates for mounting and actuating operational tooling. The self-contained chassis increases operating efficiency through: 1. Positive parts control. 2. Reduced jamming potential. 3. Design simplicity. 4. Tooling accessibility. 5. Tool standardization.



Tools are center mounted, facing outward, with provision for feeding, probing, orienting, and parts escapement. In addition, tooling such as hoppers and processing equipment can be mounted on external brackets around the outside of the turret and actuated mechanically by cams and levers operated from the main camshaft or auxiliary countershafts.

For further information, *write* Swanson-Erie Corp., 816 E. Eighth St., Erie, Pa.



Mill Rolls Wide Variety of Work

IT'S POSSIBLE to do a wide variety of metallurgical processing work on a single mill facility with a two high, four high combination rolling mill developed by Loma. The equipment is suitable for both hot and cold work and allows both shapes and flat stock to be rolled, with or without the application of tension.

The company says heavy duty design allows the mill to make reductions of more than 50 per cent per pass while maintaining tolerances as close as 5 per cent of thickness. Changeover from 8½ x 10 in., two high to the 2½ x 8½ x 10 in., four high setup takes only 30 minutes. The two high arrangement is used for hot and cold breakdown rolling of plates and sheets. Grooved rolls are available to process rounds, squares, and other shapes. In the four high setup, strip is cold finish rolled to gages as thin as 0.002 in. A heavy duty, 25 hp, variable speed drive is used on the combination rolling mill. Bearings are continuously lubricated by a closed oil circulating system.

For further information, *write* Loma Machine Mfg. Co. Inc., 114 E. 32nd St., New York 16, N. Y.

Saw Cuts Stainless Steel, Doesn't Need Coolants

CARBON and stainless steels and many of the new alloys can be cut accurately with the Promacut Uni-14SA cutoff saw and pedestal grinder. Coolants are not necessary, says the company, nor are clamps.

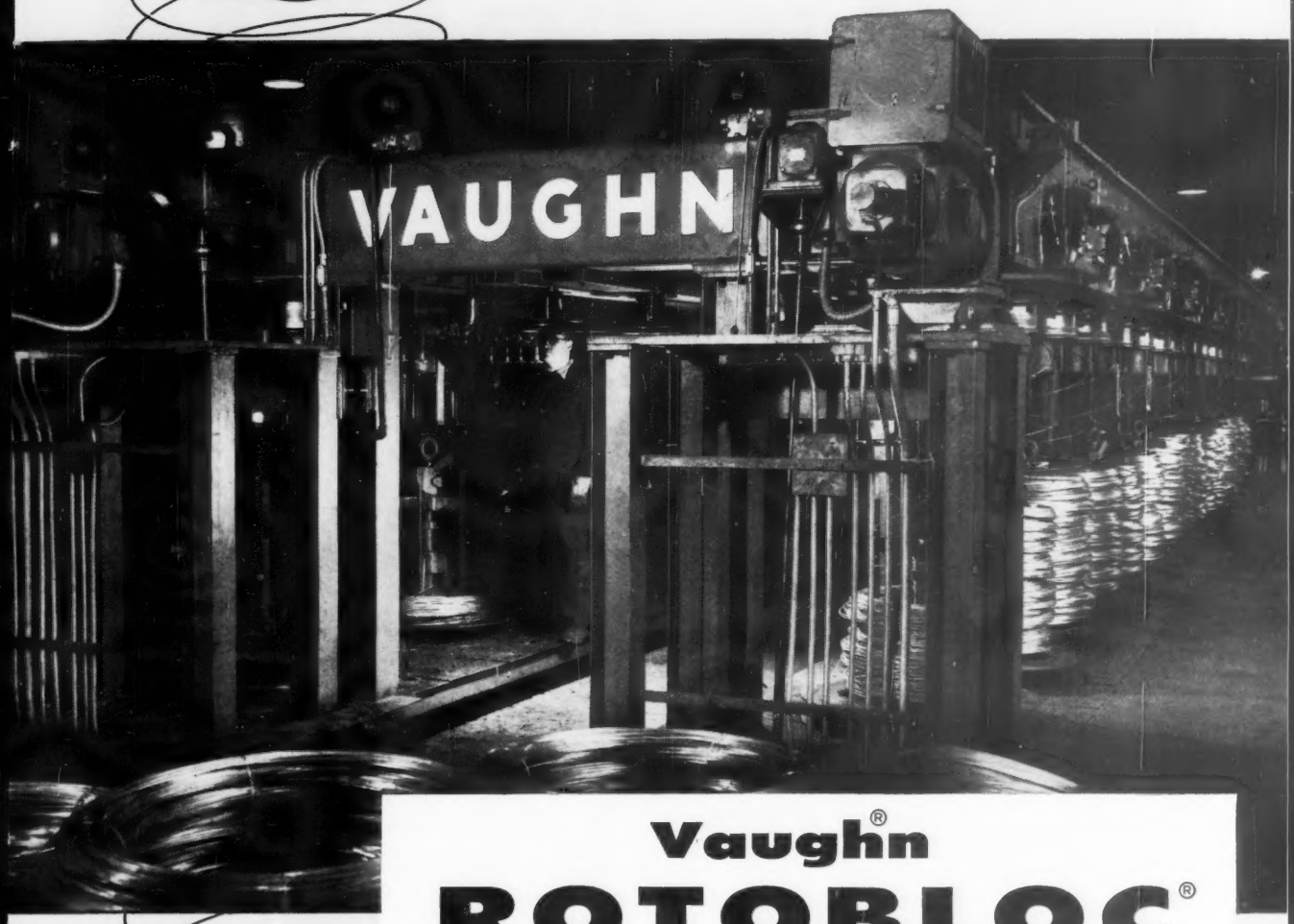
Straight cuts, miters, notches, and incisions can be made. Like the larger Promacut models, the unit produces a semimilling action rather than biting and chipping, adds the manufacturer. Speed of rotation and high torque of the direct drive motor (5 hp) moves the blade through the stock so fast that heat is not absorbed and the result is an almost burrfree cut with no bluing.

Through cuts on 2 x 2 x ⅛ in. angles are made in 1 second or less. The blade is rated for up to 2500

Large bundle–non-stop operation

without twist!

FOR USS AT DONORA WORKS, AMERICAN STEEL AND WIRE DIVISION



Vaughn® ROTOBLOC®

GALVANIZING · ALUMINIZING · PATENTING

This impressive 32-block Rotobloc installation underscores the increasing acceptance of Vaughn non-stop bundle production by leaders of the wire industry. The Vaughn Rotobloc, operating at the end of your wire processing lines, assures uninterrupted flow that means better deliveries for the customer and lower costs in the mill. ● This machine may be built in any number of blocks, and can also be designed for drum payoff, if desired. Size range is from 16 gauge galvanized to 13/32" patented wire. For additional details, write.

THE VAUGHN MACHINERY COMPANY

CUYAHOGA FALLS, OHIO, U.S.A.

COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

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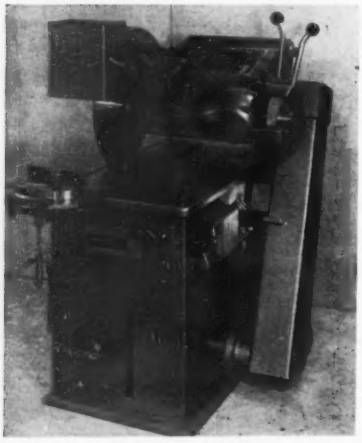


such cuts before resharpening. The head and column will clear a 15 in. plate on a through cut, making the unit suitable for production cut-off runs from long sections of wide stock.

For further information, *write* Production Machinery Inc., 4941 W. Belmont Ave., Chicago 41, Ill.

Maker Simplifies Planer Drive Design

A SIMPLIFIED, 60 hp, planer drive consists of a Life-Line H reversing drive motor of low rotor inertia, a 3600 rpm unit frame motor-generator set, and a simple control with static excitation. Voltage is variable. Automatic, dynamic braking will stop the planer instantly upon power failure.

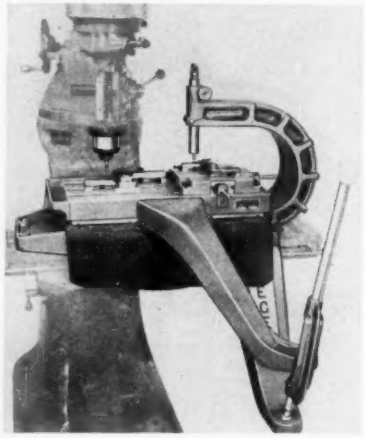
The unit can develop about 6600 lb pressure on the tool at 150 ft per minute and is capable of operating from 30 up to 300 ft per minute with a 6 to 1 gear ratio. In addition, the drive can deliver 150 per cent load for 3 minutes for plowing through heavy stock sections without slowdown.

Speed of cut and return direction are independently adjustable from 30 to 300 ft per minute. A time delay is included in the control to automatically shut down the unit after a predetermined period of idle running (adjustable up to 15 minutes). Restart is controlled from the pendant station.

For further information, *write* Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

Redesign Improves Line of Duplicator Tables

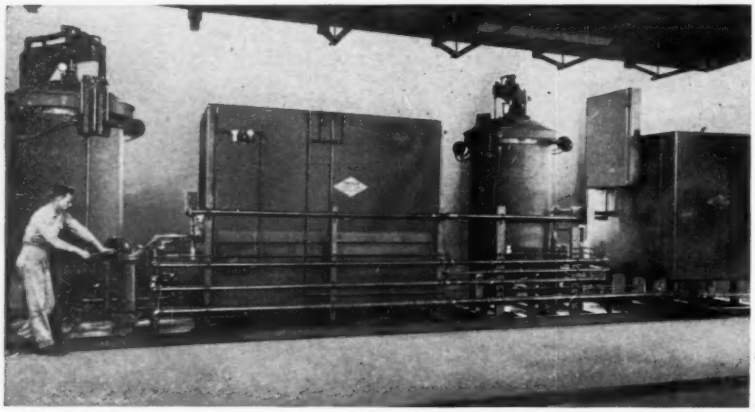
GREATER efficiency and easier operation are the results of design improvements made to the Regent line of two and three dimensional, duplicator tables.



Among the improvements is a redesign of the duplicator's ball bearing raceways for greater rigidity and smoother operation. The redesigned of the overarm also contributes to rigidity, says the maker.

Included in the line is the R-200, a two dimensional, fluid motion duplicator for contour profiling on any vertical miller and the R-300 for fast, accurate, two and three dimensional, duplicating and profiling of complex machined parts on Birdgeport millers only.

For further information, *write* J. M. Kalins & Co., 1575 Railroad Ave., Bridgeport, Conn.



Low Cost Unit Impregnates Castings

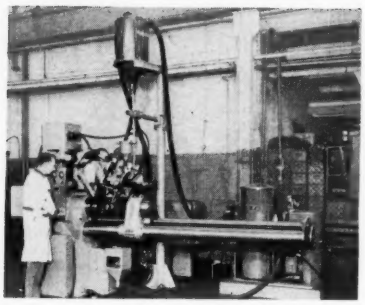
THIS batch type, casting impregnation machine uses a single steam jet to provide vacuum for both autoclaves. Advantages of lower initial equipment costs and improved operating economy are claimed by the company. The machine is designed for pit installation.

The unit shown is intended for sealing cast aluminum, automotive transmission cases with a metal oxide type sealant. It consists of two autoclaves (680 gallons working capacity each), a sealant tank (2100 gallons), a hot inhibitor rinse tank (1600 gallons), and a cold water rinse tank (1600 gallons).

For further information, *write* Prenco Mfg. Co., 2605 W. 14 Mile Rd., Royal Oak, Mich.

Unit Welds Irregular, Two Dimensional Contours

A CAM controlled, universal welding machine that automatically welds any two dimensional, irregular contour (including contours with straight or concave sections) is cited as one solution to the problem of designing and building spe-



cial purpose units for each application.

The unit consists of a headstock, tailstock, and welding head. Parts being welded are held between the headstock and adjustable tailstock. Any welding process can be adapted to the machine, says the maker. Three simple plate cams control rotary part speed, and horizontal and vertical welding head positions.

Welding speed can be varied.

For further information, *write* Expert Welding Machine Co., 17144 Mt. Eliott Ave., Detroit 12, Mich.

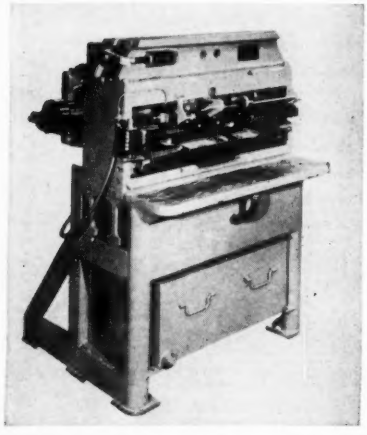
Unit Knurls up to 4 in. On 20 in. Long Shafts

FAST shaft knurling (up to 4 in. on shafts up to 20 in. long and $\frac{5}{8}$ in. in diameter) can be done on the Model 101 unit.

The work is rolled between two flat knurl blocks. The upper block is fixed.

A feed plate (cam actuated to move at one-half the speed of the lower knurl block) guides the work. Parts may be hand or hopper fed into the loading chute. Finished parts are ejected automatically onto a drain tray.

For further information, *write* Morley Machinery Corp., 3111 Winton Rd. S., Rochester 23, N. Y.



Control of Rancidity, Rust Cited for Cutting Fluid

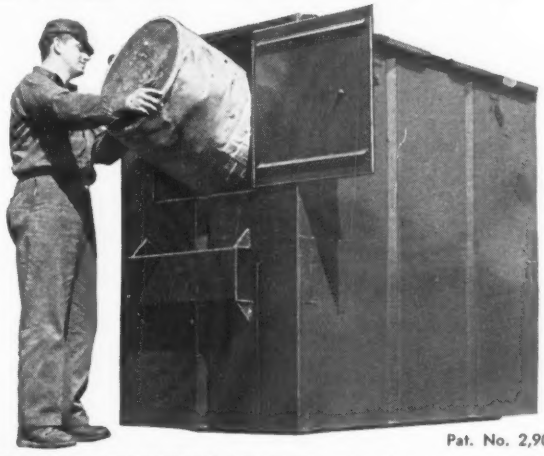
THE COMBINATION of rancidity and rust control in a cutting fluid called Five-Star Cimcool permits a wide application to problem jobs, says the manufacturer. Long tool and fluid life and high production rates are reported.

Field tests indicate two rust inhibitors in the product provide thorough protection at dilutions as lean as 1 part of concentrate to 60 parts of water.

In one application, the effectiveness of the rust control enabled a manufacturer to skip an oil dip between machining operations. A bactericide is included in the fluid.

For further information, *write* Cincinnati Milling Products Div., Cincinnati Milling Machine Co., 4701 Marburg Ave., Cincinnati 9, Ohio.

How our small plant solved its waste disposal problem WITHOUT CAPITAL OUTLAY...



Pat. No. 2,900,096

DEMPSTER-DUMPMASTER Equipped Hauler Provides Containers and Service for Small Fee

Our small Midwestern manufacturing firm did not generate enough refuse to justify ownership of its own refuse disposal system. Yet, it was plagued by unsightly trash piles, fire hazards and scattered refuse in the plant yard.

Our plant engineer then heard of a DEMPSTER-DUMPMASTER equipped private hauler in the adjoining city. A survey revealed that two big-capacity refuse containers, placed one at each end of the plant, would handle the entire refuse accumulation.

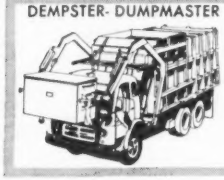
The private hauler placed the containers, and a small monthly fee covered maintenance, labor, hauling and dumping refuse. No capital outlay was involved, disposal costs were reduced, and plant housekeeping was vastly improved.

In all major cities, private haulers who own DEMPSTER-DUMPMASTER equipment render fast, efficient, low-cost refuse storage and collection service. They place one or 100 containers at your service for a reasonable fee. A free brochure describes their service in detail.

Free Brochure and Name of Nearest Private Hauler on Request

Dept. S-72, DEMPSTER BROTHERS Knoxville 17, Tenn.

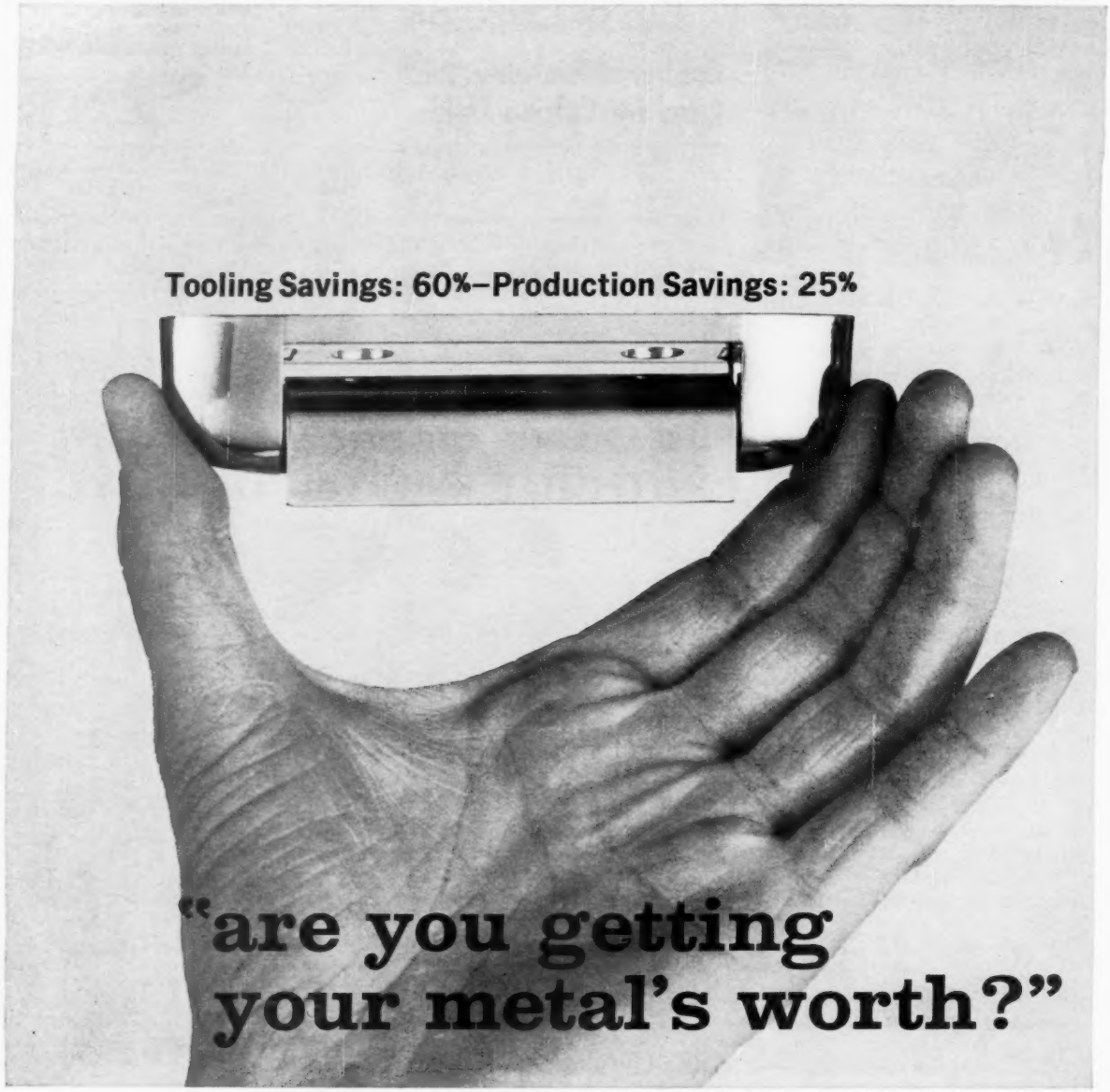
DEMPSTER-DUMPMASTER



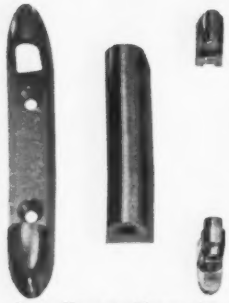
DEMPSTER-DUMPSTER

PART OF THE DEMPSTER DUMPSTER SYSTEMS ®

Tooling Savings: 60%–Production Savings: 25%



"are you getting your metal's worth?"



If time and money were no object, you could assemble this refrigerator door hinge from a steel stamping, a brass stamping, screw machine parts and just one die casting. Then you could keep busy with some tricky operations necessary to attach the hinge halves – drilling blind holes accessible only with an angle drive drilling head and staking steel pins in the holes.

However, Die Cast Products, Inc. of Gardena, California prefers the 60% reduction in tooling costs and the 25% drop in production costs achieved by a unique design using four zinc die cast components which are cast in one shot and trimmed in one operation. That way they are faced with no other secondary operations before plating – and assembly is simple.

To find out how to put zinc die castings to work for you, see your nearest die caster for information about their properties, use, design techniques and machining practices. REMEMBER – ZAMAK GIVES YOU MORE FOR LESS. ARE YOU GETTING YOUR METAL'S WORTH?

NJZ

HORSE HEAD PRODUCTS

THE NEW JERSEY ZINC CO.

160 FRONT STREET · NEW YORK 38, N.Y.

NEW literature

Write directly to the company for a copy

Steel Bar Case Histories

Eleven case studies discuss applications of "Fatigue-Proof" steel bars. Included: A main driveshaft for a heavy duty lathe, an adjusting screw for a sheave, a coil winding machine adapter, a cage screw pin, and an armature shaft for a floor surfacing machine. Ask for Case Study Portfolio No. 3. LaSalle Steel Co., P. O. Box 6800-A, Chicago, Ill.

Slitter Knife Calculator

A calculator for determining clearances of slitter knives consists of a double plastic wheel. When it is set so that an arrow points to the thickness of the material, windows show the recommended horizontal and vertical clearances. The back of the calculator gives clearance suggestions for side trimming strip and plate steel. Heppenstall Co., 4620 Hatfield St., Pittsburgh 1, Pa.

Gray Iron Castings Guide

A buyers' guide and membership directory, *Where to Buy Gray and Ductile Iron Castings,* contains an alphabetical listing of member gray and ductile iron foundries with specific data on personnel, monthly production, size, type and use of castings, foundry classifications, type of iron produced, and specific facilities. Trademarks and a geographical listing are also presented. Gray Iron Founders' Society Inc., National City-E. 6th Bldg., Cleveland 14, Ohio.

Grinding Stresses

An 81 page booklet entitled *Grinding Stresses: Cause, Effect, and Control,* comprises the collected papers which have been published as articles in the trade press, and is based on research sponsored by the Grinding Wheel Institute and the Abrasive Grain Association at the Mellon Institute. Grinding Wheel Institute, 2130 Keith Bldg., Cleveland 15, Ohio.

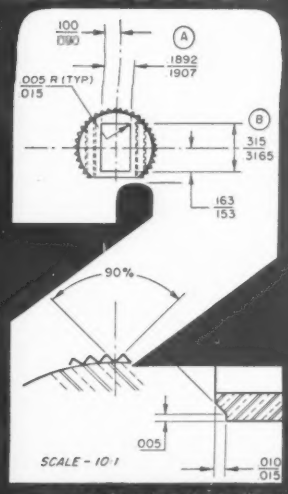
Beryllium Copper Alloys

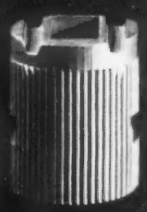
Technical information on two high strength and two high conductivity beryllium copper strip products is included in four data sheets. The sheets show physical and mechanical properties and provide information on methods of heat treating, forming, joining, and plating of beryllium copper. Brush Beryllium Co., 5209 Euclid Ave., Cleveland 3, Ohio.

Numerical Control

A 32 page booklet presents educational data on numerical controls for machine tools. The booklet defines the meaning of numerical control and explains the use of punched tape in machine tool applications. Other subjects covered include programing tapes, standardizing punched tapes, and standardized programing. Promotion Planning Dept., Friden Inc., 97 Humboldt St., Rochester 2, N. Y.

BLUEPRINT FOR





Transforming these lines and numbers into the functional reality of a sintered brass brush holder for small electric actuator motors took teamwork. A design engineer conceived it, and a metal powder fabricator brought it to fruition—at a 65% cost saving over the previous method of manufacture.

It might not have been this way. Despite a design engineer's careful planning, his blueprint could be a neatly drawn recipe for an ulcer – when looked at by a metal powder fabricator aware of the advantages and limitations of his art. Often, a fabricator has little choice but to turn out a part he knows could be made infinitely better—could be made with increased reliability, more wearability, less machining and lower costs.

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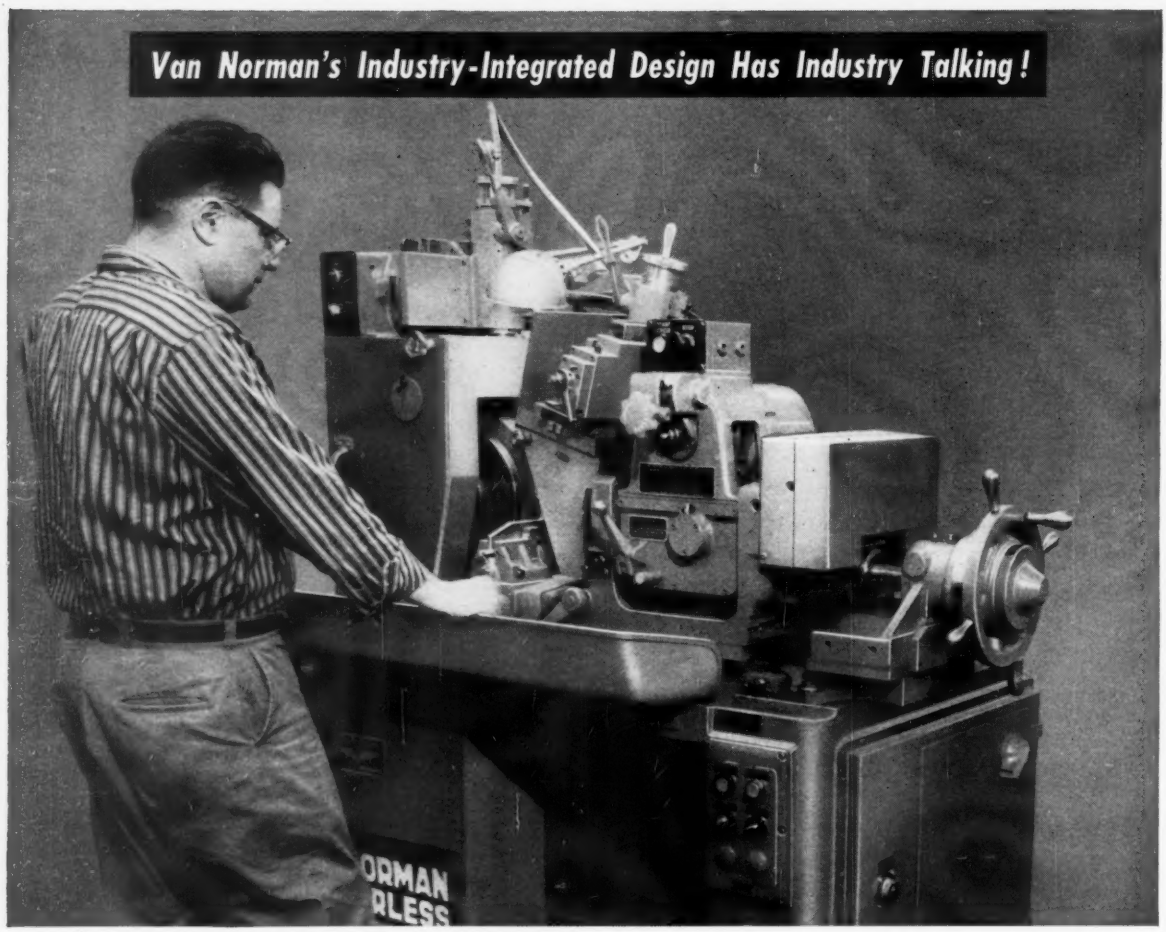

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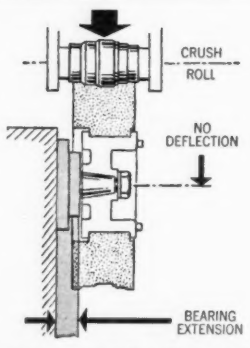

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Steel Market Has Firmer Tone

STEEL DEMAND is trending upward as metalworking plants end their vacations and automakers prepare for initial runs on 1962 models.

In the East, buying appears to be running slightly ahead of consumption. Users whose inventories are abnormally low are increasing their stocks moderately because of improving business prospects. Although the mills are still offering fast service on most products, some buyers are protecting themselves against the possibility of extended deliveries in the fall. They realize that if they wait until their suppliers start quoting four weeks instead of two, other users whose inventories are at a minimum may rush into the market and start competing with them for tonnage. Four week promises could go out to six or seven weeks overnight.

APPLIANCE MAKERS BUYING— In part, the market's better tone reflects improved sales of household appliances. Washer, range, and refrigerator manufacturers are recalling laid off workers and stepping up production. Result: Better demand for cold rolled sheets, silicon steel, and enameling stock.

AUGUST OUTLOOK BRIGHTENS— Although orders for August came in at a snail's pace in July, the total by the end of the month was fairly good. Chicago steelmakers, who predicted two weeks ago that August shipments wouldn't equal July's, are talking more optimistically. They now believe shipments will be slightly lower than July's on a daily average basis (because August has three more shipping days) but 5 to 10 per cent higher in the aggregate.

UPTURN DEFERRED?— Despite negligible progress in negotiations for new labor contracts to replace the ones expiring Aug. 31, automakers are ordering normally for August and September. August shipments to the automotive industry will be up slightly from July's, reflecting the start of 1962 model production. Automotive orders for September are disappointing to mill executives who had heard that the car companies were planning near-record output for the month. Says a Pittsburgh producer: "The orders we've had certainly don't point to a big buildup. It looks like we'll have to wait until October for that."

CALLS FOR HIGHER PRICES— The coming boost in steelworker wages "emphasizes the need for an increase in the price of flat rolled steel products," says Nicholas P. Veeder, chairman, Granite City Steel Co., Granite City, Ill. He points out that employment costs for his company will go up 3.1 per cent Oct. 1, making the total increase about 10 per cent since 1958.

Prices of some threaded fasteners are being increased 4.5 to 5 per cent.

IMPORTS RISING— Latest figures from the Commerce Department show that imports of steel mill products in May (266,000 tons) exceeded exports (159,000 tons) for the sixth consecutive month. Although imports through May were only half as large as they were in the corresponding period of 1960, they topped exports by a sizable margin—1 million vs. 744,000 tons.

PRODUCTION HOLDS— Look for ingot production in the week ending Aug. 5 to be about the same as the 1,860,000 tons that STEEL estimates the industry poured in the week ended July 29. Output then was 0.1 per cent above the previous week's. July's production was about 8.1 million ingot tons (vs. 8,551,000 tons in June).

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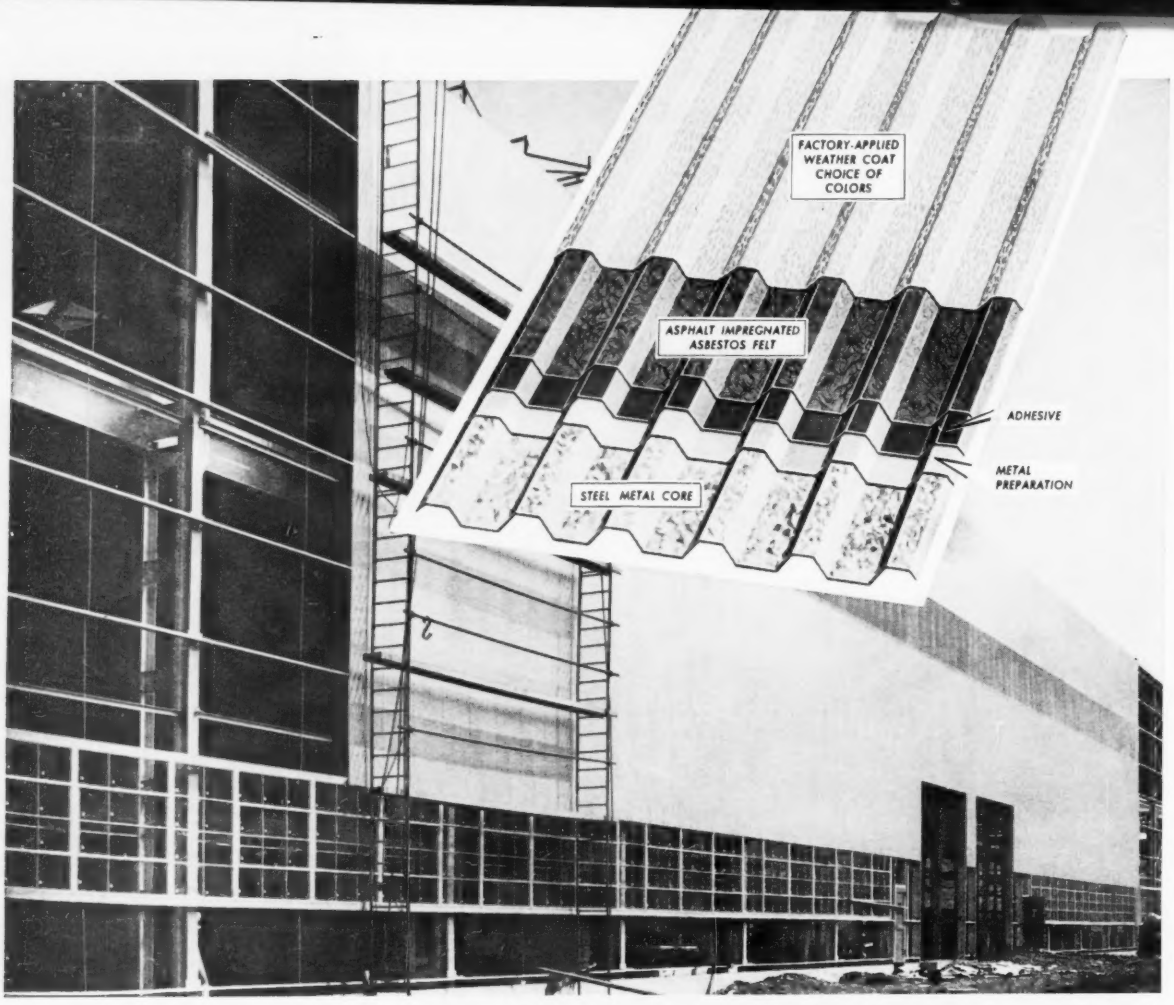


Inset shows how panels for commercial and industrial buildings are constructed to provide strength, durability, and good appearance

Building Panels Take On New Luster

IF THE TWO biggest markets for your product start to collapse, what should you do?

That's what makers of protected metal asked themselves in 1954. They found an answer, and they're still in business. They've upped their sales to a record-equaling $10 million a year. But they're not satisfied. Reason: Commercial and industrial metal clad buildings use at least $100 million worth of siding and roofing annually.

To get a bigger share of the market, protected metal must displace aluminum and galvanized steel. It may find an even greater potential by competing successfully against nonmetallics, such as corrugated asbestos and masonry.

• **Old Products**—Protected metal was introduced in the early thirties as a black, corrugated steel sheet. Originally, it was 18 to 24 gage metal topped with asphalt adhesive and a layer of asbestos felt. It was used primarily in the siding and roofing of steel mill buildings. Steelmakers liked it because it was tough, resisted corrosion, and lasted for years with little or no maintenance. Demand reached a peak shortly after World War II, when the steel industry embarked on a tremendous expansion program.

In 1949, the product was declared a fire hazard by insurance companies, so producers had to alter its composition. They stopped using asphalt as an adhesive and substituted resinous plastic or molten zinc. The new product was a cold rolled or galvanized sheet topped with asbestos felt and a coating of asphaltic plastic. The felt was laminated to the steel—one side or both—under heat and pressure. After the coating was applied, the sheet was corrugated.

• **Market Weakens**—In the mid-fifties, protected metal hit the skids. Its two biggest customers sharply

reduced their purchases. First, the steel industry slowed its expansion pace and curtailed maintenance. Then the Defense Department stopped building hangars for the Strategic Air Command and started emphasizing missiles.

Instead of wringing their hands, producers set out to improve their product and broaden its markets. Sensitive to criticism from customers ("All you're offering us is that old, black, corrugated stuff. Who wants it?"), they took a page from the aluminum industry's promotional book.

• **Color Added**—"We saw that we had to cut our costs, modernize our product, and make it more attractive so that it could compete with aluminum," says Hamilton B. Bowman, executive vice president, Bowman Steel Corp., Pittsburgh. His company and its competitors—H. H. Robertson Co., Pittsburgh, and Plasteel Products Corp., Washington, Pa. — brought protected metal out in colors (red, green, buff, gray, blue, and sepia) and a variety of shapes (2½ in. corrugated, ribbed, V-beam, mansard, and fluted).

With its new beauty and time tested durability, protected metal moved into markets that it had never penetrated. Architects specified it for light and heavy commercial and industrial buildings—powerplants, warehouses, factories, office buildings, garages, bowling establishments, and shopping centers. The Atomic Energy Commission bought it to house a nuclear powerplant at Shippingport, Pa. The Defense Department used it for barracks and transmitter stations on the Dew Line and for an administration building in the Canal Zone—underscoring its suitability for exposure to extremes of cold and heat.

• **Stiff Competition**—Since protected metal costs more than painted galvanized (30 to 55 cents per square foot vs. 20 to 35 cents), sellers stress its lower upkeep. They claim it's cheaper in the long run because it doesn't require repainting.

Competition from aluminum isn't so tough costwise (prices are about the same as those of protected metal), but it's rugged from a promotional standpoint. Aluminum is being pushed by companies that have huge advertising budgets. Protected metal producers use the same pitch against aluminum that they use against galvanized: "Our color coating is thicker and more resistant to abrasion, corrosion, and weather."

The big difference between protected metal and its competitors is that it's an engineered product, not a commodity. Sellers have to estimate, design, cut, and erect it. Protected metal suppliers have an advantage when dealing with buyers who want to assign job responsibility to a single contractor, but they undoubtedly lose out on sales to customers who want to buy off the shelf.

• **Obstacles Aplenty**—To increase its sales, the protected metal industry must overcome these obstacles: 1. Steelmakers and other manufacturers aren't as willing as they once were to pay a higher first cost for material in return for lower maintenance. The tendency is to buy cheap, produce cheap, and let tomorrow take care of itself. 2. Some companies are accumulating capital by holding buildings for short periods, deducting depreciation from taxable profits, and selling. They couldn't care less about low maintenance costs. 3. Other firms are trying to keep fixed investments at a minimum so that they can move to other areas if labor conditions deteriorate. 4. Industrial architecture is changing. As pitched roofs give way to flat roofs, protected metal yields to ordinary roof decking.

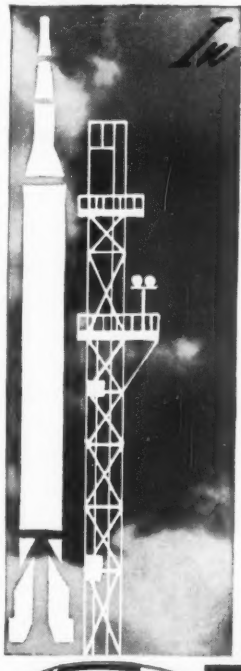
Are protected metal producers discouraged? "Not at all," says one sales executive, "but we're going to have to get out and hustle."

Sheets, Strip . . .

Sheet & Strip Prices, Pages 95 & 96

While delivery promises show little, if any, stiffening, steel buying appears to be running slightly ahead of current requirements. This is ascribed to exceedingly low inventories held by some consumers and to better business prospects for later this year.

A pickup in demand for cold rolled sheets (for automotive, metal furniture, household appliances,



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Ulbrich can supply these special metals in all tempers, all edges, in coil or cut lengths, and finish, any weight from an ounce on up, with normal delivery of two weeks. Write for complete listing of all Ulbrich metals, maximum gauges and widths.

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Incoloy	(3)	AM 355	
Monel	(3)	19-9 DX	
Hastelloy C	(4)	19-9 DL	
Hastelloy X	(4)	A286	
L605 (Haynes #25)	(4)	Rene 41	(2)
Carpenter 20	(5)	"A" Nickel (electronic grade)	

(1) Reg. U.S. Pat. Off. Armco Steel Corp.
(2) Reg. Trade Mark of General Electric Co.
(3) Reg. Trade Mark of Int. Nickel Co.
(4) Reg. Trade Mark of Union Carbide and Carbon Corp.
(5) Reg. Trade Mark of Carpenter Steel Co.

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and barrel and drum requirements) is noted. Although interest in hot rolled sheets is lagging, demand for galvanized sheets is well sustained, with several producers booked into October. Deliveries on enameling stock and electrical sheets range around 30 days; on hot rolled carbon sheets, two weeks.

Zinc coated steel strip up to 72 in. wide is being produced on a continuous processing line at the Middletown (Ohio) Works of Armco Steel Corp. (See STEEL, July 27, 1959, p. 101). The line, which employs a process developed by Armco, was built by Wean Engineering Co. Inc., Warren, Ohio. It has an hourly processing capacity of 30 tons.

Distributors . . .

Prices, Page 99

Some pickup in demand for steel from service centers is anticipated for August. No appreciable gain is expected, however, until after Labor Day. July business declined substantially for most service centers. One large distributor estimates his business was off 20 to 25 per cent from that of June.

In the Los Angeles area, distributors are getting inventories in balance, with wide flange structurals and alloy steel among products mentioned as still on the heavy side. Inquiry activity is healthy, notably from missile and other defense industries, alert to the international political crisis.

Steel Ingot Production Continues to Hold Steady

IMPROVEMENT in steel buying seems sufficiently adequate to assure an increase in output in August compared with July. Whether it will match or exceed June production (the second largest so far this year) remains a question. September production probably will exceed June's and may equal or surpass the May output (the year's peak to date).

Production for the week ended July 29 is estimated by STEEL at 1,860,000 tons, an increase of only 0.1 per cent compared with the previous week.

• **Youngstown** — Major mills here continued operating at about 52 per cent of 1960 capacity during the week ended July 29.

• **Buffalo** — Steel ingot production held at 44 per cent of 1960 capacity for the week ended July 29. There has been little variation in this level in recent weeks but the current influx of orders points to a gradual upturn in production in August.

• **Chicago**—Steelmaking operations were scheduled at 72 per cent of 1960 capacity for the week ended July 29, a gain of 1 point over the previous week's rate. Production is reflecting the fact that shipments of finished products in August will exceed July's by about 10 per cent.

• **Birmingham** — The steelmaking rate in this area is estimated at 64 per cent for the week ended July 29. That's a drop of around 3 points from the previous week.

• **Philadelphia**—Northeastern steel production reflects little change for the week ended July 29 from previous week when the AISI index reached 96, up 1 point.

• **Detroit** — Steel output declined during the week ended July 29. Production at McLouth Steel Corp. was down because of an unauthorized walkout over plant safety conditions. Other mills continued to operate at about the same level. One of the larger producers will cut back operations in August because automakers have overordered steel for September delivery.

• **San Francisco** — Mill schedules are holding firm with the prospect that the third quarter will be as good as the recently improved second quarter.

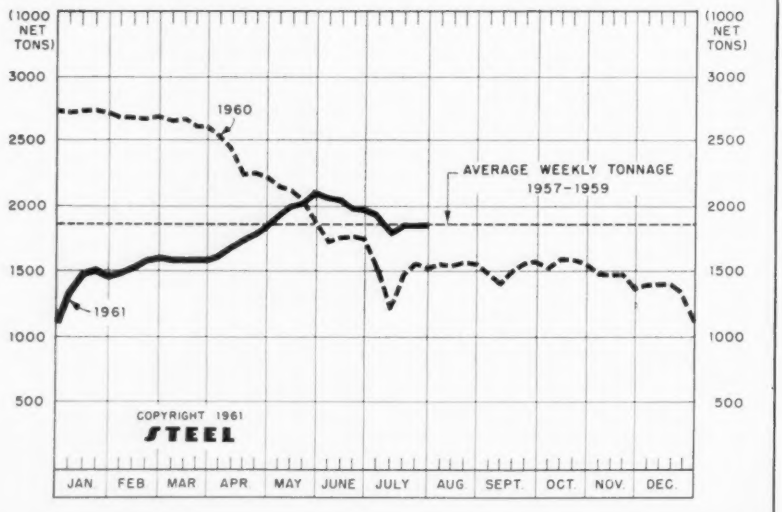
• **Cincinnati**—Steelmaking is holding steady in this area. The district's largest producer believes the seasonal decline in steel output will end in August, marking the start of an upturn to continue into the fourth quarter.

STEEL INGOT PRODUCTION

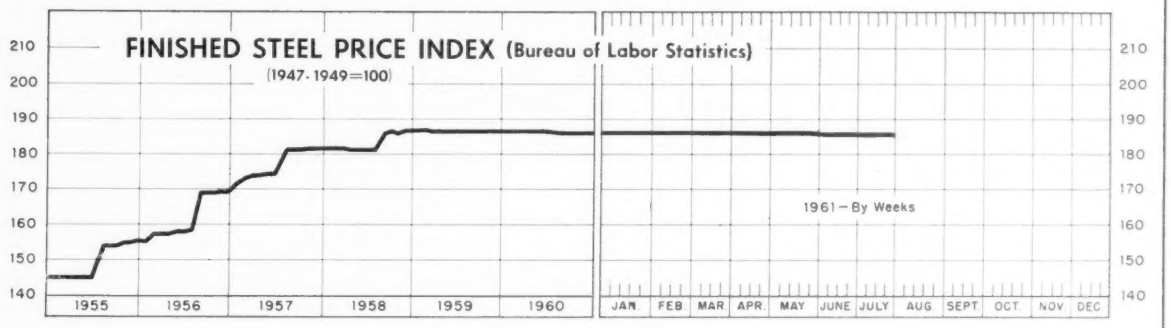
Weeks Ended	Net Tons	Change
July 29	1,860,000*	+ 0.1%
July 22	1,858,000	— 0.1%
July 15	1,860,000	+ 4.6%
Totals to July 22		
1961	50,568,000	—21.7%
1960	64,615,000	

DISTRICTS	Week Ended —July 22— Tons‡	Index†	Week Ended July 15 Index†
Northeastern	256,508	96	95
Buffalo	81,778	84	81
Pittsburgh	355,123	88	88
Youngstown	151,283	89	88
Cleveland	94,447	102	110
Detroit	122,753	117	120
Chicago	400,261	107	106
Cincinnati	88,224	117	112
St. Louis	56,229	107	104
Southern	111,648	103	112
Western	136,788	117	118
Industry	1,858,000	99.7	99.8

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



July 25, 1961	Week Ago	Month Ago	July Index	Year Ago
185.6†	185.6†	185.6†	185.5†	186.2

†Based on new weighting structure.

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended July 25

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	(N.A.)
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.643
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.225
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.460
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	193.030
		Casing, Oil Well, Alloy (100 ft)	302.600
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
		Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.372
		Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	July 26 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg = 100)	247.82	247.82	247.82	247.82	210.45
Index in cents per lb	6.713	6.713	6.713	6.713	5.701

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$131.27
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	61.09
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	60.11
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	61.63
Steelmaking Scrap, GT	37.00	37.00	37.00	31.83	47.50

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	July 26 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.25
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.25-6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.60
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.85

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, 7/32-5/8" Pitts.	6.40	6.40	6.40	6.40	5.375

PIG IRON, Gross Ton	July 26 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$62.25
Basic, Valley	66.00	66.00	66.00	66.00	60.00
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	66.26
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	66.76
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	57.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	60.50
Malleable, Chicago	66.50	66.50	66.50	66.50	63.00
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	215.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$35.50	$35.50	$36.50	$30.50	$46.50
No. 1 Heavy Melt, E. Pa.	39.00	39.00	39.00	34.00	50.00
No. 1 Heavy Melt, Chicago	36.50	36.50	35.50	31.00	46.00
No. 1 Heavy Melt, Valley	38.50	38.50	38.50	33.50	49.50
No. 1 Heavy Melt, Cleve.	35.50	35.50	35.50	31.50	45.50
No. 1 Heavy Melt, Buffalo	31.50	31.50	31.50	29.50	44.50
Rails, Rerolling, Chicago	58.50	58.50	58.50	51.50	68.50
No. 1 Cast, Chicago	41.50	41.50	41.50	40.50	45.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	27.50

Steel Prices

Mill prices as reported to STEEL, July 26, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 95; footnotes, page 97.

SEMIFINISHED

INGOTS, Carbon Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOT, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon Rolling (NT)
Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 .....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 .....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 .....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 ..99.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 .....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. C8 .....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ....99.50
S.San Francisco B3 ...109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3..121.00
Detroit S41 .....119.00
Economy,Pa. B14 .....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 .....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 .....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14 .119.00
S.Duquesne,Pa. U5 ..119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14 .122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ....5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. P5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ...6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 .....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2...6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2....5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 .....5.60
Lackawanna,N.Y. B2 ...5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFrancisco B3 .....6.15
Sterling,Ill. N15 .....5.50
Struthers,O. Y1 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W. Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N5 .....5.50
Weirton,W.Va. W6 .....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14 ..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1 .8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 .....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14 ..8.05
S.SanFrancisco B3 .....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ...5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 .....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ...6.50
Weirton,W.Va. W6 .....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ...5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 .....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B2 .....6.20
Sharon,Pa., S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 .....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1..7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

PLATES, Ingot Iron
Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R22 .....6.05
Warren,O. R2 .....6.05

FLOOR PLATES
Cleveland J5 .....6.375
Claymont,Del. P4 .....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ...5.675
Birmingham(9) C15 ..5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg.O4 .....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15..6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9) B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 .....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11.6.375
Warren,O. C17 .....6.025
Youngstown(9) R2, U5.5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 .....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1.6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ...6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14 6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 .....8.55
Lackawanna,N.Y. B2 ...8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 .....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ...5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded (Including leaded extra) Carbon
LosAngeles P2, S30...11.75*

Alloy
Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 ....7.65
Detroit B5, H5, P17 ....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ...7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 .....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ....8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy (Turned and Ground)
Cumberland,Md.(5) C19 6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 .....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.25
Detroit B5, P17 .....9.225
Detroit H5, S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ...9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025

Hammond,Ind. J5, L2 ..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ...9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

Atlanta A11 .....5.00
Birmingham C15 .....5.25
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ..6.425
Fontana,Calif. K1 ...6.375
Ind.Harbor,Ind. Y1 ....5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
Kokomo,Ind. C16 ....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.475
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. W14 ....5.675
S.SanFrancisco B3 ...6.425
SparrowsPoint,Md. B2 .5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10

BARS, Reinforcing, Billet (Fabricated, to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 .....7.33
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 16.10
Economy,Pa.(D.R.)B14 20.50
Econ.(DirectRolled)B14 13.55
Economy(Staybolt) B14 20.50
McK.Rks.(S.R.) L5 ...16.10
McK.Rks.(D.R.) L5 ...20.50
McK.Rks.(DirRolled)L5 13.55

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4)(44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1 5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 .5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14 7.525
Sharon,Pa. S3 .....7.525
SparowsPoint(36) B2 .7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2 ..6.275
Steubenville,O. W10 ....6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	....7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	....7.125	7.375
GraniteCity,Ill.G4	7.225	....
Ind.Harbor I-2	.7.225	7.425
Irvin,Pa. U5	....7.125	7.375
Kokomo,Ind. C16	.7.325	....
MartinsFry. W10	.7.125	7.375
Pitts.,Calif. C11	.7.875	....
Pittsburgh J5	...7.125	....
SparrowsPt. B2	.7.225	....
Weirton W6	....7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Enameling

Ashland,Ky A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 ....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) 9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland (28) R2 ....7.65
Niles,O. (28) R2 .....7.65
Weirton,W.Va. W6 .....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity,Ala. R2 .6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harb.,Ind. I-2, Y1 6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire Div., Hoover Ball & Bearing
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
J10 Jay Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N17 National Steel Corp.
N20 Neville Ferro Alloy Co.

O1 Ohio Ferro-Alloys Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P25 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 RelianceDiv.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw&Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S37 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S31 Sawhill Tubular Products
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada
S47 Seaway Steel Corp.

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Div., National Steel Corp.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	5.10
Allenport,Pa. P7	5.10
Alton,Ill. L1	5.30
Ashland,Ky.(8) A10	5.10
Atlanta A11	5.10
Bessemer,Ala. T2	5.10
Birmingham C15	5.10
Conshohocken,Pa. A3	5.15
Detroit M1	5.10
Ecorse,Mich. G5	5.10
Fairfield,Ala. T2	5.10
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Ind.Harbor,Ind. I-2, Y1	5.10
Johnstown,Pa.(25) B2	5.10
Lackaw'na,N.Y.(25) B2	5.10
LosAngeles(25) B3	5.85
LosAngeles C1	8.60
Minnequa,Colo. C10	6.20
Riverdale,Ill. A1	5.10
SanFrancisco S7	6.60
Seattle(25) B3	6.10
Seattle N14	6.60
Sharon,Pa. S3	5.10
S.Chicago,Ill. W14	5.10
S.SanFrancisco(25) B3	5.85
SparrowsPoint,Md. B2	5.10
Torrance,Calif. C11	5.85
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5, Y1	5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.40
Farrell,Pa. S3	8.40
Gary,Ind. U5	8.40
Houston S5	8.65
Ind.Harbor,Ind. Y1	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.60
Lowellville,O. S3	8.40
Newport,Ky. A2	8.40
Sharon,Pa. A2, S3	8.40
S.Chicago,Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10	7.575
Bessemer,Ala. T2	7.575
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.575
Fairfield,Ala. T2	7.575
Farrell,Pa. S3	7.575
Gary,Ind. U5	7.575
Ind.Harbor,Ind. I-2, Y1	7.575
Lackawanna,N.Y. B2	7.575
LosAngeles(25) B3	8.325
Seattle(25) B3	8.575
Sharon,Pa. S3	7.575
S.Chicago,Ill. W14	7.575
S.SanFrancisco(25) B3	8.325
SparrowsPoint,Md. B2	7.575
Warren,O. R2	7.575
Weirton,W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.35
Warren,O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7	7.425
Dearborn,Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover,O. G6	7.425
Evanston,Ill. M22	7.425
Farrell,Pa. S3	7.425
Follansbee,W.Va. W10	7.425
Fontana,Calif. K1	9.20
FranklinPark,Ill. T6	7.425
Ind.Harbor,Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport,Pa. E10	7.525
NewBedford,Mass. R10	7.875
NewBritain,Conn. S15	7.875
NewCastle,Pa. B4, M23	7.425
NewHaven,Conn. D2	7.875
NewKensington,Pa. A6	7.425
Pawtucket,R.I. R3, N8	7.975
Philadelphia P24	7.875
Riverdale,Ill. A1	7.425
Rome,N.Y.(32) R6	7.425
Sharon,Pa. S3	7.425
Trenton,N.J.(31) R5	8.875
Warren,O. R2, T5	7.425
Worcester,Mass. A7	7.975
Youngstown Y1	7.425
Youngstown S41	7.425

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie,Pa. S18	15.55
Cleveland A7	15.55
Dover,O. G6	15.55
Farrell,Pa. S3	15.55
FranklinPark,Ill. T6	15.55
Harrison,N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville,O. S3	15.55
Pawtucket,R.I. S8	15.90
Riverdale,Ill. A1	15.55
Sharon,Pa. S3	15.55
Worcester,Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High Strength, Low-Alloy

Cleveland A7	10.80
Dearborn,Mich. S3	10.80
Dover,O. G6	10.80
Farrell,Pa. S3	10.80
Ind.Harbor,Ind. Y1	10.80
Sharon,Pa. S3	10.80
Warren,O. R2	10.80
Weirton,W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3	7.50
Sharon,Pa. S3	7.50

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
New York W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	....	10.70	12.90	15.90	18.85
Trenton,N.J. R5	8.95	10.40	12.60	15.60	18.55
Warren,O. T5	9.50	10.70	12.90	15.90	18.85
Worcester,Mass. A7, T6	8.95	10.40	12.60	15.60	18.55
Youngstown S41					

Spring Steel (Tempered)

	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7	7.425*
Dover,O. G6	7.425*
Evanston,Ill. M22	7.525*
McKeesport,Pa. E10	7.50*
NewCastle,Pa. M23	7.425*
Riverdale,Ill. A1	7.525*
Warren,O. B9, S3, T5	7.425*
Worcester,Mass. A7	7.975
Youngstown S41	7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	8.175

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell,Pa. S3	5.525
Riverdale,Ill. A1	5.675
Sharon,Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.10	9.35	9.75
Fairless,Pa. U5	9.10	9.35	9.75
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

Tin Plate,Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.20
Fairless,Pa. U5	8.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Arma-ture	Elec-tric	Motor	Dyna-mo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. $Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	8.00
Aliquippa,Pa. J5	8.00
Alton,Ill. L1	8.20
Atlanta A1	8.00
Bartonville,Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville,Ind. M8	8.10
Donora,Pa. A7	8.00
Duluth A7	8.00
Fairfield,Ala. T2	8.00
Fostoria,O.(24) S1	8.10
Houston S5	8.25
Jacksonville,Fla. M8	8.35
Johnstown,Pa. B2	8.00
Joliet,Ill. A7	8.00
KansasCity,Mo. S5	8.25
Kokomo,Ind. C16	8.10
LosAngeles B3	8.95
Minnequa,Colo. C10	8.25
Monessen,Pa. P7, P16	8.00
Palmer,Mass. W12	8.30
Pittsburg,Calif. C11	8.95
Portsmouth,O. P12	8.00
S.Chicago,Ill. R2	8.00
S.SanFrancisco C10	8.95
SparrowsPoint,Md. B2	8.10
Sterling,Ill.(1) N15	8.00
Sterling,Ill. N15	8.10
Struthers,O. Y1	8.00
Waukegan,Ill. A7	8.00
Worcester,Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria,O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa.(10) B2	12.65
KansasCity,Mo. U3	12.90
LosAngeles(2) B3	13.60
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Muncie,Ind. I-7	13.60
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	13.70
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.,Md.(10)B2	12.75
Struthers,O. Y1	13.40
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
Kokomo,Ind. C16	9.85
LosAngeles B3	10.70
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
NewHaven,Conn. A7	10.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.075
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester,Mass. A7	10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Bartonville,Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Fostoria,O. S1	9.80
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
LosAngeles B3	10.20
Milbury,Mass.(12) N6	10.05
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
Muncie,Ind. I-7	9.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.20
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Wor'ster,Mass.A7,J4,T6	10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	16.50
Bartonville,Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville,Ind. M8	16.40
Fostoria,O. S1	16.30
Houston S5	16.55
Jacksonville,Fla. M8	16.65
Johnstown,Pa. B2	16.30
KansasCity,Mo. S5	16.55
Kokomo,Ind. C16	16.30
Minnequa,Colo. C16	16.55
Monessen,Pa. P16	16.30
Muncie,Ind. I-7	16.50
Palmer,Mass. W12	16.60
S.SanFrancisco C10	17.15
Waukegan,Ill. A7	16.30
Worcester,Mass. A7, J6	16.60

ROPE WIRE (A)

Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S41	13.45
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler

(14½ Ga.) (per 97 lb net box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	9.02
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	9.02
Kokomo,Ind. C16	8.88
LosAngeles B3	9.20
Minnequa,Colo. C10	8.02
Pittsburg,Calif. C11	9.20
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	9.30
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	9.30
Kokomo,Ind. C16	9.16
LosAngeles B3	9.50
Minnequa,Colo. C10	*9.30*
Pittsburg,Calif. C11	9.50
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	9.35
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	9.35
Kokomo,Ind. C16	9.21
LosAngeles B3	9.55
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.55
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2 1-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	
Cleveland A7	17.85	
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	19.10	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	17.95	19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	

WOVEN FENCE, 9-15 Ga. Col.

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality

	6 to 8 gage	An'ld Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.85	19.90
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55
Houston(48) S5	9.25	9.80**
Jack'vill,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in. larger 12.85 7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

Prices are in process of being revised upward and new schedule will be published in Aug. 7 issue.

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent: heavy hex nuts 1¼ in. through 1½ in. tapped 8 threads, add 10 per cent.)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts. 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Hot Galvanized and Zinc Plated:

Packaged	39.25
Bulk	46

BOLTS, Standard stock sizes:

Plain Finish	50

Hot Galvanized and Zinc Plated:

Packaged	39.25
*Bulk	46

*Hot galvanized or zinc plated lag bolts only—for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:

Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:

Packaged	+5
Bulk	19

Through 1 in. diam., longer than 6 in.:

Packaged	+29

HEXAGON NUTS: American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50

Hot Galvanized and Zinc Plated:

Packaged	39.25
Bulk	46

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St. Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2¼	12	54.23	63.57	48.13
2½	12	58.73	68.83	52.13
2¾	12	62.62	73.40	55.59
3	12			

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....(16)	6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 0.70c; 1 15/16 to 8 in., inclusive, 2.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) 3/16" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(29) Sheared; for universal mill add 0.45c.
(31) Widths over 5/8 in.; 7.375c, for widths 5/8 in. and under to 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in., and smaller rounds and 2½ in. and smaller hexagons; 9.625c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1⅛		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	49.50
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	48.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	76.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	62.25
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	75.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	26.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	42.00
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malle-able	Besse-mer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%. Foundry grade, 1.75% or under, deduct 50c.
Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
Port Colborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Chicago I-3 (Phos. 0.075% max)	71.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Phos. 0.075% max)	71.00
Erie, Pa. I-3 (Phos. 0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.50	10.26	10.06	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	9.45	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.90	10.40	11.52	12.40	10.05	13.35	16.59	10.50	9.83	11.85
Buffalo	9.30	10.05	11.80	11.70	9.45	11.45	16.30	9.90	9.40	11.80
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.70	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.38	10.26	10.75	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	9.07	9.88	11.75	10.63	8.48	12.98	16.95	8.71	8.31	9.68
Detroit	9.48	10.46	11.05	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	8.67	9.48	11.35	10.23	8.08	13.10	16.55	8.31	7.91	11.57
Indianapolis	9.66	10.64	11.14	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.84	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.57	10.55	11.05	11.74	9.57	11.00	16.30	9.92	9.41	11.70
Newark, N. J.	9.81	10.34	11.54	12.37	10.05	13.25	16.40	10.35	9.79	11.82
New York	10.07	10.78	11.35	12.37	10.44	13.25	16.40	10.90	10.22	11.82
Philadelphia	9.50	10.00	10.66	11.25	9.65	11.95	16.38	9.85	9.60	11.10
Pittsburgh	9.22	10.53	11.68	11.49	9.22	11.25	15.95	9.57	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	11.08	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	9.57	10.24	11.39	11.74	9.57	11.49	16.54	9.92	9.41	11.70
San Francisco	10.65	11.65	11.75	12.70	10.55	15.10	17.25	11.10	10.80	12.95
Seattle	11.35	12.45	13.40	12.80	10.80	16.20	17.85	11.50	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.20	17.85	11.35	10.80	13.45

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ¼ in. x 1 in.; hot rolled carbon bars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plate, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hitchins, Olive Hill, Ky., Athens, Troup, Tex., Clearfield, Curwensville, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo.; Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., Frostburg, Md., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Lehi, Utah, $175.

Super-Duty: Ironton, Ohio, St. Louis, Mexico, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Frostburg, Md., $200; Stevens Pottery, Ga., $210; Troup, Tex., $215; Lehi, Utah, $263.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Hawstone, Thompsontown, Pa., Ensley, Ala., Portsmouth, Ohio, St. Louis, $158; Warren, Niles, Windham, Ohio, $163; E. Chicago, Ind., Joliet, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $133; Philadelphia, Clearfield, Pa., $138; Warren, Ohio, $148.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Johnstown, Pa., Vandalia, Mo., $97; Chester, New Cumberland, W. Va., Freeport, Vanport, Merrill Station, Clearfield, Pa., Wellesville, Irondale, New Salisbury, Ohio, $100; Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120; Lehi, Utah, $175.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $250; Danville, Ill., $253; Fords, N. J., Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., Frostburg, Md., $260; Troup, Tex., $265.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $320; Troup, Tex., Fords, N. J., Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $360; Troup, Tex., Fords, N. J., Philadelphia, $365.

Tar Bonded Brick (per ton)

Dolomite: Narlo, Ohio, $87.50. Dolomite-Magnesite: Narlo, Ohio, $109.50. Magnetite: Narlo, Ohio, $128.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310; Reesdale, Pa., $355.

Runners (per 1000)

Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234; Reesdale, Pa., $245.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines, Chewelah, Wash., $46; minus ⅝ in., grains bulk, Luning, Nev., $46; ⅝ in. grains with fines (periclase), Baltimore, $73, Pascagoula, Miss., $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer	$11.45
Mesabi bessemer	11.60
Old Range nonbessemer	11.70
Old Range bessemer	11.85
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$15.75-16.25*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75
48% no ratio	24.00-26.00†

Turkish

48% 3:1	35.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.40

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$3.00-3.50
60-65%	3.60-4.00

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Inches Length	Per 100 lb
2	24	$84.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $29-$29.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85§
40 mesh, bags	7.50††
Electrolytic Iron, Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	27.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe. ..36.75, ton deld. east of Mississippi.	
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, $8.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.80
Bronze powder, 90/10	*56.80*
Copper, all types	15.00*
Lead	7.50*
Manganese, 500 lb and up	25.00*
Nickel, all types	0.78-1.06
Nickel-Silver	*56.00*
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20

Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa. furnace	$14.75-15.25
Connellsville, Pa. foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.65	$5.70	$5.60	$5.50	$5.80
Bar Size Angles	5.85	5.90	5.80	5.70	6.00
Structural Angles	5.75	5.80	5.70	5.60	5.90
I-Beams	5.65	5.70	5.60	5.50	5.80
Channels	5.75	5.80	5.70	5.60	5.90
Plates (basic bessemer)	5.45	5.50	5.40	5.30	5.60
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	23.90	23.95	23.85	23.55	25.30
Barbed Wire (†)	6.25	6.30	6.20	6.10	6.40
Merchant Bars	5.95	6.00	5.90	5.80	6.10
Hot-Rolled Bands	5.95	6.00	5.90	5.80	6.10
Wire Rods, Thomas No. 5 (Niederrhein)	5.80*	5.90	5.75	5.75	6.00
Wire Rods, O.H., No. 5 (Niederrhein)	6.00*	6.10	5.95	5.95	6.20
Bright Common Wire Nails (§)	7.35	7.40	7.30	7.20	7.50

†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier. *Except Boston.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot of 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16%, deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 5% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.27, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5-7%, Si 4-6%, S 0.03% max, 20.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max, Si 1.0% max, S 0.03%, 21.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Low-Carbon Ferrochrome: (Simplex) Cr 63-66% or 68-71%: C 0.025% max, 31.50c; C 0.010% max, 32.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Cr 68-73%; C 0.25% max, 33.00c. Cr 65-71%; C 0.05% max, 32.00c; C 0.10% max, 31.75c; C 0.20% max, 31.50c; C 0.50% max, 31.25c; C 1.0% max, 31.00c; C 1.5%, 30.75c; C 2.0% max, 30.50c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25 max). SM x D, carload, bulk, 20.05c per lb of alloy, carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 22.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 22.50c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 13.5c per lb contained Si. Packed, c.l. 16.0c, ton lot 17.45c, less ton 19.1c f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). $2.45 per lb (all quantities) of contained W. Delivered.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.60 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l., packed 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

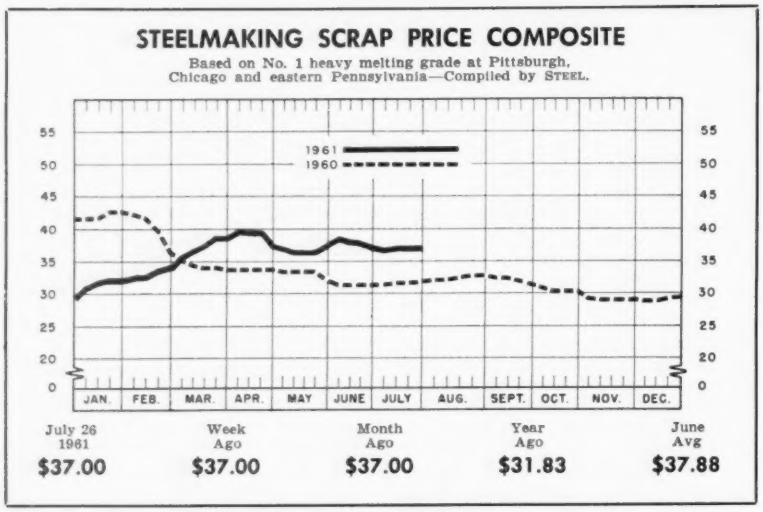
V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-70%). Per lb of contained Mo in 2000-lb container, f.o.b. Langeloth and Washington, Pa., $1.89 in all sizes except powdered which is $1.95.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.60; in bags, $1.59, f.o.b. Langeloth and Washington, Pa.



Scrap Buying Interest Lags

Consensus in trade is that next price move will be upward on prospects of increased consumption in August. STEEL's composite holds at $37 for third consecutive week

Scrap Prices, Page 104

● **Pittsburgh**—Trade sources predict that bids on the August list of No. 1 factory bundles from an automotive plant will be the same as last month's or $1 a ton higher. Lack of consumer buying is forcing some dealers to take almost anything they can get. Brokers who are buying for mills outside the district say some dealers are netting only $20.50 a ton on sales of No. 2 heavy melting.

● **Philadelphia**—Despite slow demand, domestic scrap prices are reasonably strong. Low phos structurals and plates are up $1 to $43-$45; couplers, springs, and wheels, up more than $1 to $44-$45; other grades are unchanged.

A cargo of 6000 tons of turnings from Muskegon, Mich., which recently arrived here afire, has been unloaded, and the ship (the Norwegian *Gyda*) has been sent to drydock for repairs. The ship was to have picked up additional tonnage here for Japan.

● **New York**—An advance in low phos structurals and plate to $34-$35 features an otherwise unchanged market on scrap. In general, brokers' buying prices have shown little variation this month. Domestic buying has been light, but steady. Foreign buying, the main support of the market here, has eased, but has been sufficient to sustain price levels.

● **Youngstown**—The scrap market here remains dull. Attracted by slightly higher prices here, scrap is moving from the Pittsburgh area, but the spread is so small the tonnage isn't large.

● **Detroit**—Sixteen foreign freighters were taking on scrap in the Detroit waterway last week. Most of the material is bound for the Far East, particularly Japan.

Sometimes a trickle, sometimes a flood, this flow of scrap has been continual since the shipping season opened. It's the strongest reason that prices have held fairly steady through the spring and summer. Although most of the scrap being loaded was purchased some months ago, there are enough fill-ins on orders to keep dealers and brokers jockeying for business.

With auto lists closing, prices are expected to hold steady, possibly rise a fraction because of the limited amount of scrap to be generated by carbuilders in August.

● **Chicago**—The bottom has probably been reached in steelmaking scrap prices. While a firming is discernible in some grades, the market is holding. Steelmaking operations will probably be slightly higher in August than they were in July, but until the automotive industry's labor situation is settled, steel production planning for the next several months is going to be done guardedly.

Demand for cast scrap is a little improved and should be even better now that gray iron foundries are concluding their vacation shutdowns.

● **Buffalo**—Diverse price trends in railroad scrap grades are reported here. Most railroad items are off $1 a ton in new railroad lists, but rerolling rails are $1.50 a ton higher at $63.50-$64.50.

Mill scrap grades were nominally unchanged in the absence of new business. If mills place new orders at the start of August, they are expected to do so at or near current price levels. Failure of mills to come into the market next month likely would force mill grades into lower ground.

● **Cincinnati**—Two area mills are expected to enter the scrap market this week for August delivery. It's likely their programs will see a sideways movement in the dealer market unless the mills place large tonnage orders.

● **St. Louis**—The scrap market has a strong undertone, and some prices have inched up. The largest mill here has raised prices $1 on No. 2 heavy melting and $1 on No. 2 bundles. It is also paying $2 more for 2 ft foundry steel, which is now listed at $31 a ton. Some upward movement is evident in rail scrap, but because small tonnages are moving, the hike is not significant.

● **Birmingham** — A mixed price trend has developed in the scrap market here. No. 1 heavy melting and No. 1 bundles are up 50 cents a ton; No. 2 bundles and No. 1 wheels, up $1; and No. 1 cupola cast, off 50 cents. Shovel turnings are quoted unchanged at $20-$21 a ton, but a substantial tonnage has been bought at $2 above this level. Brokers still quote No. 1 railroad heavy melting at $38-$39, but one mill has paid $40-$41.

● **Houston** — One major mill in Texas has placed its orders for Au-

gust. Prices for No. 2 heavy melting steel at $33 and No. 2 bundles at $23 are $1 a ton higher than current quotations.

In Baton Rouge, La., and New Orleans, the export price for No. 2 steel is $35-$36. Some exporters are willing to go as high as $40.50-$41—for No. 1 steel in ample tonnages.

• **San Francisco**—The steel scrap market is devoid of excitement. Prices are holding, but many of the postings are nominal since mills have been buying little. Exports continue to support the market as they have for many months.

• **Los Angeles**—Mill vacations are stemming the flow of scrap. Because of short supplies, yards are unable to meet fairly strong demand, primarily from Japan. The shortage is not likely to be long term, once mills are back in full operation; thus, a price increase is not probable.

Pig Iron . . .

Pig Iron Prices, Page 99

Merchant pig iron demand still drags, although a slight gain in orders in August is anticipated because there will be less downtime for vacations at various foundries.

Demand for iron for export continues active at Buffalo with large tonnages moving via the St. Lawrence Seaway and the Barge Canal. Shipments to the Midwest via lake freighter are expected to accelerate in August.

Republic Steel Corp. has resumed production in one of its two idle blast furnaces at its Thomas Works, Birmingham. The furnace had been idle four months. The second furnace has been idle for over a year and a half.

Phoenix Steel Corp., Phoenixville, Pa., plans to relight its blast furnace at Chester, Pa., about Aug. 1. The furnace, idle since May, 1960, has been equipped with a new and larger turboblower that will increase capacity.

Blast furnace production in the U. S. totaled 5,730,198 net tons during June, the highest monthly total since May, 1960, when the figure was 6,394,411 net tons of pig iron and ferroalloys. During May, the output was 5,693,628 tons, says the American Iron & Steel Institute, New York.

New American Can Div. To Build Canning Plants

American Can Co., New York, is forming a new division, Custom Packers, to serve soft drink companies by establishing a network of high speed canning operations. The company will pack for soft drink producers in cans and cartons of their own choosing, whether they are supplied by American Can or any of its competitors.

Consumption of soft drinks in cans is growing at a rate of more than 50 per cent a year. More than 1 billion carbonated soft drinks in cans will be sold this year.

The initial operations of the Custom Packers network will be in the Winston-Salem-Greensboro, N. C., area, Jacksonville, Fla., Baltimore, Cincinnati, New Orleans, and St. Louis.

Fastener Prices Rise

Prices of several forms of threaded fasteners are being revised upward an average of 4.5 to 5 per cent. The increases are being made through reduction of discounts.

Among companies making increases are National Screw & Mfg. Co., Cleveland, which made the changes effective July 24, and Screw & Bolt Corp. of America, Pittsburgh, where the effective date was July 28.

Products affected include cap screws and nuts. Unchanged are small screw items, rivets, and track bolts.

Screw & Bolt Corp.'s new discounts on hex head, cap screws and nuts are 29 per cent for less than a full container, 43 per cent for a whole container, and 53 per cent for 20,000 lb and over.

Plates . . .

Plate Prices, Page 94

Sheared carbon plate demand is only fair, with deliveries ranging from 10 days to three weeks, slightly more extended than recently. Alloy plate deliveries average around five weeks. Considerable activity is noted in specialties, such as stainless clad for the oil and chemical industries. Floor plates also are moving well.

Railroad tonnage is light, but the Pennsylvania and the Norfolk & Western have work coming up by late August or early September. Included in the proposed Pennsylvania program will be the rebuilding of bodies for 2500 hopper cars.

Alan Wood Steel Co., Conshohocken, Pa., will cease production of sheared plates Aug. 10 and will resume Aug. 28 on a new and larger mill which will replace the present unit.

Plate fabricating subcontracts, including submarine hull sections, are being farmed out by the Naval shipyard at Portsmouth, N. H.; the last of six closes Aug. 11. Welding, machining, and heavy duty machinery is required. Considerable work is on grade Hy-80 plates.

Steel Bars . . .

Bar Prices, Page 94

After a strong June, carbon and alloy bar producers had a weak July. June was good because of brisk automotive demand. One barmaker told STEEL its Detroit office "booked so much tonnage in June that in other years we would have been forced to cut them back."

July dropped abruptly because of vacations in customer plants. A medium sized bar producer commented that "it looks like everybody forgot our address" and predicted that his July shipments would be 10 per cent below June's.

LOOKING FOR SURPLUS MACHINERY?
By checking the classified pages of STEEL each week you'll be able to find many different types of equipment which will fit your requirements. Used or surplus equipment—you can best find it in STEEL's classified columns.

HOT DIP GALVANIZING
JOSEPH P. CATTIE & BROTHERS, INC.
2520 East Hagert Street
Phone: Re-9-8911 Philadelphia 25, Pa.

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, July 26, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

July 26	$37.00
July 19	37.00
June Avg.	37.88
July 1960	31.63
July 1956	47.70

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	28.00-29.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	23.00-24.00
No. 1 busheling	35.00-36.00
No. 1 factory bundles	43.00-44.00
Machine shop turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Short turnings	19.00-20.00
Cast iron borings	18.00-19.00
Cut structurals:	
2 ft and under	*42.00-43.00*
3 ft and under	*39.00-40.00*
Heavy turnings	27.00-28.00
Punching & plate scrap	*43.00-44.00*
Electric furnace bundles	43.00-44.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	34.00-35.00
Stove plate	34.00-35.00
Unstripped motor blocks	24.00-25.00
Clean auto cast	35.00-36.00
Drop broken machinery	45.00-46.00§

Railroad Scrap

No. 1 R.R. heavy melt.	*40.00-41.00*
Rails, 2 ft and under	50.00-51.00
Rails, 18 in. and under	51.00-52.00
Random rails	45.00-46.00
Angles, splice bars	44.00-45.00
Railroad specialties	45.00-46.00
Rails, rerolling	59.00-60.00

Stainless Steel Scrap

18-8 bundles & solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	85.00-90.00
410 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	37.00-38.00
No. 1 hvy melt., dealer	35.00-36.00
No. 2 hvy melting	30.00-31.00
No. 1 factory bundles	41.00-42.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	21.00-22.00
No. 1 busheling, indus.	37.00-38.00
No. 1 busheling, dealer	35.00-36.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	*43.00-44.00*
Punchings & plate scrap	*44.00-45.00*

Cast Iron Grades

No. 1 cupola	41.00-42.00
Stove plate	36.00-37.00
Unstripped motor blocks	33.00-34.00
Clean auto cast	46.00-47.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	*39.00-40.00*
R.R. malleable	47.00-48.00
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	50.00-51.00
Angles, splice bars	44.00-45.00
Axles	56.00-57.00
Rails, rerolling	58.00-59.00

Stainless Steel Scrap

18-8 bundles, solids	185.00-190.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	31.00-32.00
No. 2 bundles	24.00-25.00
No. 1 busheling	31.00-32.00
Shovel turnings	17.00-18.00
Machine shop turnings	13.00-14.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	39.00-40.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	37.00-38.00
No. 1 machinery	44.00-45.00

Railroad Scrap

Rails, random lengths	42.00-43.00
Rails, 3 ft and under	48.00-49.00
Railroad specialties	41.00-42.00
Rails, rerolling	*63.50-64.50*

CLEVELAND

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	24.00-25.00†
No. 1 factory bundles	*42.00-43.00*
No. 1 bundles	35.00-36.00
No. 2 bundles	23.00-24.00†
No. 1 busheling	35.00-36.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	30.00-33.00
Cut structurals, plate, 2 ft and under	*40.00-41.00*
Low phos. punchings & plate	37.00-38.00
Alloy free, short shovel turnings	18.00-19.00
Electric furnace bundles	37.00-38.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	47.00-48.00
Burnt cast	32.00-33.00
Drop broken machinery	48.00-49.00

Railroad Scrap

R.R. malleable	47.00-48.00
Rails, 2 ft and under	48.00-49.00
Rails, random lengths	44.00-45.00
Rails, 18 in. and under	49.00-50.00
Cast Steel	41.00-42.00
No. 1 railroad cast	48.00-49.00
Railroad specialties	43.00-44.00
Angles, splice bars	44.00-45.00
Rails, rerolling	55.00-56.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	160.00-165.00
18-8 turnings	95.00-100.00
430 clips, bundles, solids	80.00-85.00
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	25.00-26.00†
No. 1 busheling	*39.00-40.00*
No. 1 bundles	*40.00-41.00*
No. 2 bundles	25.00-26.00†
Machine shop turnings	14.00-15.00†
Shovel turnings	19.00-20.00†
Cast iron borings	19.00-20.00†
Low phos.	*41.00-42.00*
Electric furnace bundles	*41.00-42.00*

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	27.50-28.50
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
No. 1 busheling	32.00-33.00
Machine shop turnings	9.00-10.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00
Cast iron borings	11.00-12.00
Low phos. 18 in.	39.00-40.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	36.00-37.00
Rails, 18 in. and under	47.00-48.00
Rails, random lengths	41.00-42.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	34.00
No. 2 heavy melting	*29.00*
No. 1 bundles	35.00
No. 2 bundles	*24.00*
No. 1 busheling	34.00
Machine shop turnings	13.00
Shovel turnings	15.00

Cast Iron Grades

No. 1 cupola	37.00
Charging box cast	34.00
Heavy breakable cast	32.00
Unstripped motor blocks	34.00
Clean auto cast	38.00
Stove plate	32.00

Railroad Scrap

No. 1 R.R. heavy melt.	*35.00*
Rails, random lengths	*39.00*
Rails, rerolling	*55.00*
Rails, 18 in. and under	*44.00†*
Angles, splice bars	40.00†

PHILADELPHIA

No. 1 heavy melting	39.00
No. 2 heavy melting	35.00
No. 1 bundles	43.00
No. 2 bundles	24.00-26.00
No. 1 busheling	43.00
Electric furnace bundles	44.00
Mixed borings, turnings	17.00†
Shovel turnings	20.00
Machine shop turnings	14.00
Heavy turnings	25.00†
Structurals & plates	*43.00-45.00*
Couplers, springs, wheels	*44.00-45.00*
Rail crops, 2 ft & under	51.00-53.00

Cast Iron Grades

No. 1 cupola	40.00
Heavy breakable cast	40.00
Drop broken machinery	49.00-50.00†
Malleable	49.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	4.50-5.00†
Mixed borings, turnings	5.00-5.50†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	*34.00-35.00*

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	31.00-32.00

Stainless Steel

18-8 sheets, clips, solids	155.00-160.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	35.00-36.00
No. 2 bundles	23.00-24.00
No. 1 busheling	31.00-32.00
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00

Cast Iron Grades

No. 1 cupola	32.00-33.00
Mixed cast	30.00-31.00
Stove plate	27.00-28.00
Heavy breakable	26.00-27.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	39.00-40.00

Stainless Steel Scrap

18-8 bundles & solids	170.00-175.00
18-8 turnings	70.00-75.00
430 bundles & solids	70.00-75.00
430 turnings	11.00-12.00

BIRMINGHAM

No. 1 heavy melting	*37.50-38.50*
No. 2 heavy melting	29.00-30.00
No. 1 bundles	*37.50-38.50*
No. 2 bundles	*21.00-22.00*
No. 1 busheling	38.00-39.00
Cast iron borings	10.00-11.00
Machine shop turnings	18.00-19.00
Shovel turnings	20.00-21.00
Bar crops and plate	43.00-44.00
Structurals & plate	42.00-43.00
Electric furnace bundles	38.00-39.00
Electric furnace:	
3 ft and under	36.00-37.00
2 ft and under	37.00-38.00

Cast Iron Grades

No. 1 cupola	*41.50-42.50*
Stove plate	42.00-43.00
Unstripped motor blocks	31.00-32.00
No. 1 wheels	*35.00-36.00*

Railroad Scrap

No. 1 R.R. heavy melt.	38.00-39.00
Rails, 2 ft and under	46.00-47.00
Rails, random lengths	41.00-42.00
Angles, splice bars	44.00-45.00

HOUSTON

(Brokers' buying prices; f.o.b. car)	
No. 1 heavy melting	35.00
No. 2 heavy melting	31.00-32.00
No. 1 bundles	35.00-36.00
No. 2 bundles	21.00-22.00
Machine shop turnings	10.00-11.00
Low phos. plate & structurals:	
3 ft	38.00-39.00
2 ft and under	43.00-44.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Heavy breakable	26.00-27.00
Foundry malleable	30.00-31.00
Unstripped motor blocks	31.00-32.00

Railroad Scrap

R.R. heavy melt. (3 ft)	37.00-38.00

LOS ANGELES

No. 1 heavy melting	40.00-42.00
No. 2 heavy melting	39.00
No. 1 bundles	40.00-41.00
No. 2 bundles (export)	30.00-31.00
Machine shop turnings	15.00-17.00
Shovel turnings	15.00-17.00
Cast iron borings	16.00-17.00
Electric furnace scrap	50.00

Cast Iron Grades

No. 1 cupola	44.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	42.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	41.00-42.00
No. 2 bundles	31.00
Shovel turnings	18.00
Electric furnace	54.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable	38.00
Unstripped motor blocks	39.00
Stove plate (f.o.b. plant)	37.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	44.00-45.00
No. 1 hvy (unprepared)	39.00
No. 2 heavy melting	41.00-42.00
No. 2 hvy (unprepared)	36.00
No. 2 bundles	31.00
Shovel turnings	16.00-18.00
Electric furnace	52.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	39.00
Stove plate (f.o.b. plant)	37.00
Unstripped motor blocks	39.00

SAN FRANCISCO

No. 1 heavy melting	43.00**
No. 2 heavy melting	40.00**
No. 1 bundles	34.00**
No. 2 bundles	28.00**
Machine shop turnings	18.00
Mixed borings, turnings	18.00
Cast iron borings	18.00
Heavy turnings	18.00
Shovel turnings	18.00

Cast Iron Grades

No. 1 cupola	46.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	31.00
No. 2 hvy melt, 2 ft & under	*30.00*
No. 1 bundles	31.00
No. 2 bundles	*23.50*
Mixed steel scrap	23.00
Mixed borings, turnings	12.00
Busheling, new factory: Prepared	31.00
Unprepared	25.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

In the last few days, there has been a moderate pickup. Many customers have ended their vacations and have resumed ordering. Automotive purchases for August and September are termed "excellent" by one mill. It expects its August shipments to be nearly as large as June's, and that month's were the largest in more than a year.

Production of the M-14 rifle will be expedited. Two commercial shops are now producing the item at Worcester, Mass., and New Haven, Conn., and a third source is being negotiated.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 95

Order backlog of concrete reinforcing bars is the largest among the heavier finished steel products. Unfilled business is unevenly distributed among mills and distributors because of prolonged price competition which has discouraged some sellers from estimating on a substantial volume of new business. Bridge and highway bar prices are the weaker segment of the market.

Rails, Cars . . .

Track Material Prices, Page 97

While domestic freight car orders may be a shade more numerous, total buying remains light. Some builders estimate demand is running about parallel with that of a month ago.

June orders totaled 1214 cars, the American Railway Car Institute and the Association of American Railroads said. That compares with 3666 for May and 321 for June last year.

Deliveries in June totaled 3142 freight cars compared with 3360 in May and 6042 in June, 1960.

Cars on order as of July 1 amounted to 8489 in railroad shops and 3332 in commercial shops, a total of 11,821 vs. 13,964 on June 1 and 29,555 on July 1 last year. Of the units on order at the beginning of this month, 2836 were boxcars, 2560 hoppers, 1956 gondolas, 1602 refrigerators, and 1332 flatcars. Others included 639 tankcars, 575 covered hoppers, and 200 cabooses.

Pullman-Standard Div., Pullman Inc., has orders for 221 new type flatcars on which production has begun at its Butler, Pa., plant.

The new type flatcar is an adaptation of Pullman - Standard's Lo-Dek which was brought out a year ago to haul new autos. The new model is nearly 2 ft longer and 11 in. lower than conventional flatcars. It is equipped with three-tier racks capable of hauling 15 autos compared with four in boxcars.

Wire . . .

Wire Prices, Pages 96 & 97

After improving steadily for five months, demand for manufacturers' wire fell sharply in July. A medium sized producer says its shipments dropped about 20 per cent, largely because of vacations in customer plants. August shipments will probably be about 15 per cent higher than July's. They're not likely to equal those of May or June.

Wiremakers look for a substantial pickup in order entry after Aug. 15. That's when makers of autos, furniture, and appliances will be ordering springs needed for their new product lines.

Buying of finished wire for reinforcing or construction work is heavier in New England than for industrial end goods. One high carbon, specialty mill in the East plans to increase operations 4 points to 73 per cent of capacity. Like drawn wire, rod volume is slow, although consumer stocks in both cases are generally low.

Structural Bookings Dip

June bookings of structurals amounted to 297,555 tons, off sharply from 391,730 tons in May, but down only slightly from the 299,596 tons in June, 1960, reports the American Institute of Steel Construction. Total bookings for the first half amounted to 1,858,825 tons, off 4 per cent from 1,940,982 tons in the same period in 1960.

Shipments continued at a level above the average for June, representing the second best month so far this year. The industry delivered 361,159 tons, only slightly below May's 17 month high of 365,000 tons. Total shipments for the first

(*Please turn to Page* 109)

Steel Shipments by Markets—May, 1961

(All grades, carbon, alloy, stainless)

(Net tons)

	—May Shipments—		—First Five Months—	
Markets	1961	1960	1961	1960
Converting & Processing	219,160	241,407	955,076	1,628,802
Forgings (except auto)	68,224	67,307	297,487	481,089
Fasteners	82,019	80,066	346,294	603,730
Warehouses:				
Oil & Gas	118,416	68,879	525,762	594,387
All Other	998,413	1,025,981	4,077,823	6,132,088
Total Warehouse	1,116,829	1,094,860	4,603,585	6,726,475
Construction:				
Oil & Gas	201,035	241,354	775,191	1,025,819
All Other	652,238	674,987	2,712,230	3,663,973
Total Construction	853,273	916,341	3,487,421	4,689,792
Contractors' Products	359,097	341,248	1,460,338	1,895,223
Automotive:				
Vehicles, Parts	1,183,101	1,037,704	4,247,534	7,302,470
Forgings	41,169	22,325	150,670	246,707
Total Automotive	1,224,270	1,060,029	4,398,204	7,549,177
Rail Transportation:				
Rails, Track, etc.	45,154	94,029	205,353	470,209
Cars & Locomotives	77,909	176,592	384,464	1,075,594
Rapid Transit	1,268	1,282	14,229	17,539
Total Railroad	124,331	271,903	604,046	1,563,342
Shipbuilding	61,016	46,185	249,051	298,899
Aircraft	6,347	7,753	29,688	39,579
Oil & Gas Drilling	30,656	30,185	149,773	241,040
Mining, Quarrying, etc.	24,857	26,356	105,259	146,110
Agricultural:				
Machinery	56,448	54,061	299,932	429,820
All Other	35,095	20,910	131,011	122,603
Total Agricultural	91,543	74,971	430,943	552,423
Machinery, Tools, etc.	336,856	364,785	1,449,129	2,234,110
Elec. Machinery	169,941	169,323	769,162	1,045,391
Appliances, Utensils	150,699	156,269	686,723	1,002,812
Other Domestic Equipment	154,547	196,496	698,429	992,421
Containers:				
Cans and Closures	539,159	471,736	2,385,580	2,430,435
Barrels, Drums, etc.	64,867	73,879	305,588	435,729
All Other	47,858	60,192	171,157	325,340
Total Containers	651,884	605,807	2,862,325	3,191,504
Ordnance, Military	10,076	10,415	60,836	59,432
Exports	134,708	328,348	623,111	1,051,157
Nonclassified	177,358	182,378	832,253	949,046
Total Shipments	6,047,691	6,272,432	25,099,133	36,941,554

Data from American Iron & Steel Institute.

Stocks Have Moved Up Since May

(Percentage of purchasing agents responding to STEEL inventory survey)

	Under 10 Days		10-30 Days		30-60 Days		60-90 Days		3-6 Mo	
	Now	3 Mo Ago	Now	3 Mo Ago	Now	3 Mo Ago	Now	3 Mo Ago	Now	3 Mo Ago
Copper, Copper-Base Alloys	10	20	21	27	37	33	32	20	..	..
Copper Wire, Cable	20	17	13	..	47	66	20	17	..	..
Aluminum Mill Products	8	8	8	15	46	46	23	23	15	8
Aluminum Ingots	29	40	14	40	43	..	14	20	..	..
Zinc Diecasting Alloys	29	40	14	20	14	20	43	20	..	..

Underlined figures indicate number of days' inventory carried by the greatest number of respondents.

Nonferrous Users Stand Pat on Stocks

Nonferrous Metal Prices, Pages 108 & 109

ONLY moderate changes in consumer stocks of nonferrous metals are expected in the next three months.

The trend to replenish inventories that began in the second quarter will be continued by some users. Others (fewer) have excessive stocks and will continue to pare them. Three months hence, most will hold about the same inventory as now.

Those are the highlights of STEEL's nationwide quarterly survey of purchasing agents.

• **What's Ahead** — User inventory plans break down this way: In copper and copper alloys, 74 per cent will hold stocks at current levels, 16 per cent will add to them, and 10 per cent will trim. Copper wire and cable stocks will be increased by 6 per cent of consumers, cut by another 6 per cent, and the remaining 88 per cent will hold fast. In aluminum mill products, an almost even split is shown between those planning to add to stocks and those that will trim: 25 per cent will trim, 21 per cent will raise, and 54 per cent will stand pat. The most significant trend to build up stocks is among users of aluminum ingots and zinc alloys for diecastings. In both cases, 13 per cent of the users will increase stocks while the remaining 87 per cent will hold steady.

The buying forecasts indicate the average metalworking firm will be carrying nonferrous stocks of 30 to 60 days over the next three months.

• **Past Pattern** — The majority of metalworking companies are carrying the same number of days' inventory as they did in May (see table). But some significant shifts showed up in the three month period. In copper and copper-base alloys, 32 per cent lowered stocks, 5 per cent increased; in aluminum mill products, 32 per cent cut, 20 per cent raised; and in zinc alloys for diecasting, 13 per cent have lowered.

Aluminum Improves

Warehouse sales of aluminum will increase in every major product category this year if current forecasts hold up. The National Association of Aluminum Distributors polled its membership and came up with the following forecast for 1961: Sheets, plates, and coils, up 12.8 per cent from 1960; wire, rods, bars, and structurals, up 7.3 per cent; extrusions and pipe, up 13.5 per cent. The distributors predicted tubing sales would be only a shade better, up 0.5 per cent.

• **Primary Up** — Symptomatic of better consumer demand is a steady climb in primary production.

• **Consumption Breaking**—During 1961's first quarter, a higher percentage of aluminum output found its way into consumer durable goods and machinery and equipment, reports the Aluminum Association. The transportation industry took less but remained the second highest user. Here is the breakdown of shipments of semifabricated products to consuming industries in percentage: Building products, 18.9; transportation, 13.8; containers and packaging, 12.4; consumer durable goods, 10.7; electrical, 8.6; machinery and equipment (except electrical), 5.1; distributors and jobbers, 18.5; shipments for conversion into wrought products, 6.3; exports, 2.4; and miscellaneous and unidentified uses, 3.3.

Value Analysis Fact Sheet

ANACONDA FREE-CUTTING BRASS ROD

Not the plain old work horse many think, it can be produced with a variety of valuable properties—in addition to high machinability—to do many special jobs better, and at lower cost.

For the great majority of high-speed screw machine jobs, free-cutting brass rod is a standard shelf item.

But in an increasing number of jobs, the free-cutting property alone is not enough. Deep drilling to close tolerances, roll-threading, knurling, staking, slotting, etc., call for uniformity in a variety of other property combinations.

Fortunately free-cutting brass is a unique "on the fence" alloy (see Metallurgical Comment at the right) that can be adapted to answer these new demands—help screw machine operators meet increasingly rigid requirements and utilize cost-saving practices.

Specialized applications. Over the past several years, Anaconda American Brass has introduced several refinements into the usual mill practice for free-cutting brass and has developed different rods for specialized applications. In most instances, these rods will still meet ASTM and Government specifications.

Chip breaking. For the user who demands a rod with uniform ability to break up into small chips, an alloy is supplied which regularly contains substantial quantities of beta. This, because it is brittle at room temperature, adds to the chip-breaking ability of the lead already there. This rod is, therefore, particularly good for high-speed forming and drilling applications. On the other hand, it is the least ductile and can therefore be formed and headed to the least extent.

Cold forming. The usual and more numerous special applications require uniform ability to be cold-worked—as in roll-threading, knurling, heading, and other deforming. Properties of these special rods are refined by heat treatment or special drawing operations so that the rod can be consistently cold-worked. Normally, there is little sacrifice in machinability, but there is some loss in the ability of the rod to break into small chips.

Deep drilling. In small rod particularly, there has been an increasing demand for material that can be drilled to close tolerances. Special drawing and heat treating practices were developed to produce a rod which performs uniformly, even in such exacting applications as ball point pen tips.

High Strength. And for those applications calling for uniformly higher strength than the usual material, there is a rod produced by special drawing practices.

Technical assistance. If you have a special problem—whether it involves a variation of free-cutting brass or another free-cutting or engineering copper alloy—call in your Anaconda American Brass representative. He'll make available to you the experience and services of metallurgical and mill specialists. Or write: Anaconda American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 6148

FOR MORE INFORMATION about Anaconda Rods for Screw Machine Products—including physical properties, mechanical properties, composition and machinability — write for Publication B-14. Address: Anaconda American Brass Company, Waterbury 20, Connecticut.

Metallurgical Comment

Free-Cutting Brass can provide relatively wide variations in temper and ductility within the range of composition defined in ASTM and Government specifications (60 to 63% Cu, 2.5 to 3.7% Pb, remainder Zn).

In the commonly available rod temper, referred to in ASTM specifications as "half hard" and more commonly in the trade as "hard," tensile strength may range from 50,000 to 70,000 psi, depending on the rod size and the manufacturer.* And there can be a comparable variation in cold-working properties.

Here's why. The range of 60 to 63% copper was selected for free-cutting brass because it is the lowest which can be used to produce an alloy that can be hot-worked readily and also cold-worked. This means a brass that can be hot-extruded down to small sizes—and that later can be cold-worked to a modest degree.

In more technical terms, free-cutting brass is at the transition point between the alpha phase (the ductile form of the alloy) and the beta phase (the form that's hard and brittle at room temperature but readily worked when hot). Thus, relatively minor changes in composition and fabrication practices can make substantial shifts in the proportion of alpha and beta grains—hence in strength and ductility. Various combinations of these properties can be maintained uniformly by careful control of mill practices.

Free-cutting property of the alloy is, of course, provided by lead dispersed through it—and is not materially affected by changes in other properties.

Standard Anaconda Free-Cutting Brass-271 has a composition of 61.50% Cu, 3.25% Pb, 35.25% Zn. This composition and the mill procedures used are designed to provide a rod which will fit the great majority of high-speed screw machine work.

*In special hard temper the tensile strength of small sizes will approach 90,000 psi.

ANACONDA®
FREE-CUTTING ROD
Anaconda American Brass Company

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 29.00; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 31.00 deld; custom smelters, 31.00 nom; lake, 31.00 deld; fire refined, 30.75 deld.

Germanium: First reduction, ingots, less than 1 kg 36.00-37.50 per gram; 1-10 kg 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld; 24-90 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $193-197 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 81.25; 10-lb pigs, unpacked, 89.00; "XX" nickel shot, 88.75; "F" nickel shot for addition to cast iron, in kegs, 81.75; "F" nickel, 5 lb ingots, 82.75. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.09; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 77.50.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $5.25 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 115.625.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.25.

Zinc: Prime Western, 11.50; brass special 11.70; intermediate, 11.70, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.35; special high grade, 12.50 deld. Diecasting alloy ingot No. 3, 13.75; No. 2, 14.25; No. 5, 14.00 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb; 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.25-26.00; No. 12 foundry alloy (No. 2 grade), 21.75-22.25; 5% silicon alloy, 0.60 Cu max, 23.50-24.00; 13 alloy, 0.60 Cu max, 23.50-24.00; 195 alloy, 24.75-25.75; 108 alloy, 22.25-22.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.25; grade 2, 22.00; grade 3, 21.00; grade 4, 20.00.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 405, 27.50; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.955, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.98. Weatherproof 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	147	126	145
Strip, C.R.	133	114	145
Plate, H.R.	134	116	133
Rod, Shapes, H.R.	116	95	116
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam. 24-60 in.; length, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	...	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.00
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.50-24.00; No. 2 heavy copper and wire, 22.75-23.25; light copper 20.00-20.50; No. 1 composition red brass, 20.50-21.00; No. 1

BRASS MILL PRICES

MILL PRODUCTS a

	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	SCRAP ALLOWANCES d (Based on copper at 31.00c) Clean Heavy	Rod Ends	Clean Turnings
Copper	56.13b	50.36-51.36	....	57.32	27.00	27.00	26.25
Yellow Brass	49.27	35.77c	49.56	53.43	20.375	19.50c	18.50c
Low Brass, 80%	52.15	52.09	52.44	56.21	22.875	22.625	22.125
Red Brass, 85%	53.17	53.11	53.46	57.23	23.875	23.625	23.125
Com. Bronze, 90%	54.73	54.67	55.02	58.54	24.75	24.50	24.00
Manganese Bronze	57.69	51.27	61.54	....	19.25	19.00	18.50
Muntz Metal	51.94	47.25	....	....	19.125	18.875	18.375
Naval Brass	53.94	47.75	60.25	58.10	19.00	18.75	18.25
Silicon Bronze	61.39	60.58	60.68	79.80	26.50	26.25	25.75
Nickel Silver, 10%	65.56	67.16	66.91	....	26.00	25.75	13.00
Phos. Bronze, A-5%	76.97	77.47	76.72	78.90	28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 19.50-20.00; new brass clipping, 18.00-18.50; light brass, 15.00-15.50; heavy yellow brass, 15.00-15.50; new brass rod ends, 17.00-17.50; auto radiators, unsweated, 16.50-17.00; cocks and faucets, 17.25-17.75; brass pipe, 17.50-18.00.

Lead: Soft scrap lead, 7.25-7.50; battery plates, 3.00-3.25; linotype and stereotype, 8.50-8.75; electrotype, 8.00-8.25; mixed babbitt, 10.00-10.50.

Monel: Clippings, 26.00-26.50; old sheets, 25.00-25.50; turnings, 18.50-19.00; rods, 25.00-25.50.

Nickel: Sheets and clips, 56.00-58.00; rolled anodes, 56.00-58.00; turnings, 53.00; rod ends, 56.00-58.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 3.00-3.50; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 4.00-4.50; segregated low copper clips, 10.75-11.25; segregated high copper clips, 9.75-10.25; mixed low copper clips, 10.25-10.75; mixed high copper clips, 9.75-10.25.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 9.50-10.00; clean borings and turnings, 7.00-7.50; segregated low copper clips, 14.50-15.00; segregated high copper clips, 13.00-13.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.50; clean borings and turnings, 8.50-9.00; segregated low copper clips, 13.50; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50-13.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.

Copper and Brass: No. 1 heavy copper and wire, 28.25; No. 2 heavy copper and wire, 26.00; light copper, 23.75; refinery brass (60% copper) dry copper content, 24.75.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 28.00; No. 2 heavy copper and wire, 26.00; light copper, 23.75; No. 1 composition borings, 23.00; No. 1 composition solids, 23.50; heavy yellow brass solids, 18.00; yellow brass turnings, 15.50; radiators, 19.50.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.50; oval, 44.50; electrodeposited, 37.50; cast, 42.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 117.50; 500-1999 lb, 110.50; 2000-4999 lb, 107.00; 5000-29,999 lb, 106.00; 30,000 lb, 105.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 134.50; 200-499 lb, 133.00; 500-999 lb, 132.50; 1000 lb or more, 132.00.

Zinc: Balls, 18.25; flat tops, 18.25; flats, 21.00; ovals, 20.25, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.50; 2000-5900 lb, 13.50; 6000-11,900 lb, 13.25; 12,000-22,900 lb, 13.00; 23,000 lb or more, 12.50.

Nickel-Chloride: 100 lb, 47.50; 200 lb, 45.50; 300 lb, 44.50; 400-4900 lb, 42.50; 500-9900 lb, 40.50; 10,000 lb or more, 39.50.

Nickel Sulphate: 5000-22,999 lb, 31.00; 23,000-39,900 lb, 30.50; 40,000 lb or more, 30.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 86.50; 100-600 lb, 76.80; 700-1900 lb, 74.10; 2000-9900 lb, 72.20; 10,000 lb or more, 70.90.

Stannous Chloride (Anhydrous): 100 lb, 144.80; 400 lb, 134.80; 800-19,900 lb, 113.50; 20,000 lb or more, 109.30.

Stannous Sulphate: Less than 50 lb, 152.20; 50 lb, 122.20; 100-1900 lb, 120.20; 2000 lb or more, 118.20.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 105)

half were 1,858,960 tons, up 24,315 tons from the total for the same period a year ago.

Order backlogs as of June 30 totaled 2,414,684 tons. Of that amount, 1,351,574 tons (56 per cent) are scheduled for fabrication within the four months ending Oct. 31.

Structural Shapes . . .

Structural Shape Prices, Page 94

Structurals are moving actively at most mills and service centers, but independent fabricators are not doing so well because of competition from mills and other independent shops.

Fabricating shops in New York City and on Long Island have been adversely affected by strikes. Construction work underway has been curtailed by strikes of concrete mix truck drivers, as well as by a shortage of structurals from strike-bound shops.

A leading fabricator in Los Angeles which usually averages a $2 million annual volume estimates sales for the first six months were off 10 per cent. Work backlog has dropped from 3½ months in June to three months or less in July.

Structural fabricating shops in New England expect difficulty in passing on higher labor costs. A new labor contract with Boston area shops adds up to about 12 cents an hour. The Boston agreement is applicable eventually to most other New England shops.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

6500 tons, plant, Aluminum Laboratories Inc., Oswego, N. Y., to Belmont Iron Works, Eddystone, Pa.

2430 tons, state highway, FICE 61-1 and FAVIVE 61-1, Queens County, New York, to American Bridge Div., U. S. Steel Corp., Pittsburgh.

1500 tons, boiler plant, National Bureau of Standards, Gaithersburg, Md., to Lehigh Structural Steel Co., Allentown, Pa.

1200 tons, department store, Bamberger's, Camden, N. J., to Belmont Iron Works, Eddystone, Pa., through William L. Blanchard Co., general contractor.

1145 tons, 71 transmission towers, Public Service Electric & Gas Co., for erection in Caldwell and Clifton, N. J., area, to Alcoa Products, Aluminum Co. of America, Pittsburgh.

900 tons, Robert Treat Hotel addition, Newark, N. J., through George F. Driscoll Co., New York, to Bethlehem Fabricators Inc., Bethlehem, Pa.

600 tons, plant in Pittsburgh area, International Paper Co., New York, to Pittsburgh Bridge & Iron Works, Pittsburgh.

600 tons, apparatus service shops, Cuyahoga Heights, Ohio, General Electric Co., Schenectady, N. Y., to Burger Iron Works, Akron, Ohio.

565 tons, Hancock Airport Terminal, Syracuse, N. Y., to City Iron Works, Hartford, Conn.

350 tons, plant and office building addition, Auburn, N. Y., General Electric Co., to Bethlehem Fabricators Inc., Bethlehem, Pa.

346 tons, four 3-span and two 1-span composite wide flange beam bridges, Shelburne connection, Interstate Route 189, Burlington-South Burlington, Vt., I-189-3(11), to City Iron Works, Hartford, Conn.; Lane Construction Corp., Meriden, Conn., general contractor; also 283 tons, concrete reinforcing bars and 12,670 linear feet steel piles.

330 tons, two 3-span and one 1-span composite wide flange beam bridges, Interstate Route 89, South Burlington, Vt., I-89-3(14) contract 2, to City Iron Works, Hartford, Conn.; Lane Construction Corp., Meriden, Conn., general contractor.

275 tons, department store and supermarket, Nanuet, N. Y., through Arlen Operating Co., to Kurtz Iron Works.

245 tons, Route 221, Sec. 14B, Union County, New Jersey, to Irvington Steel & Iron Co., Irvington, N. J.

224 tons, state highway development, FARC 61-57, Essex County, New York, to Goodwin-McDowell.

186 tons, three 1-span composite wide flange beam bridges, Williston-South Burlington, Vt., to City Iron Works, Hartford, Conn., I-89-3 (14) contract 1; Lane Construction Corp., Meriden, Conn., general contractor.

130 tons, chapel, Manhattanville College of the Sacred Heart, Purchase, N. Y., to Mineola Steel Fabricators, Long Island, through George A. Fuller Co., New York.

CLASSIFIED

Representatives Wanted

FOUNDRY REPRESENTATIVE FOR NEW YORK CITY

Old Established Foundry desires manufacturer's representative with noncompetitive lines to sell steel castings produced to all specifications; Meehanite Metal, all types; Ductile Irons; Ni-Resist, and Ni-Hard Irons.

Must have man familiar with foundry practice and experienced in castings sales. Foundry now has several established New York customers.

Submit resume for confidential handling to:

Box 950, STEEL
Penton Bldg. Cleveland 13, Ohio

Machinery For Sale

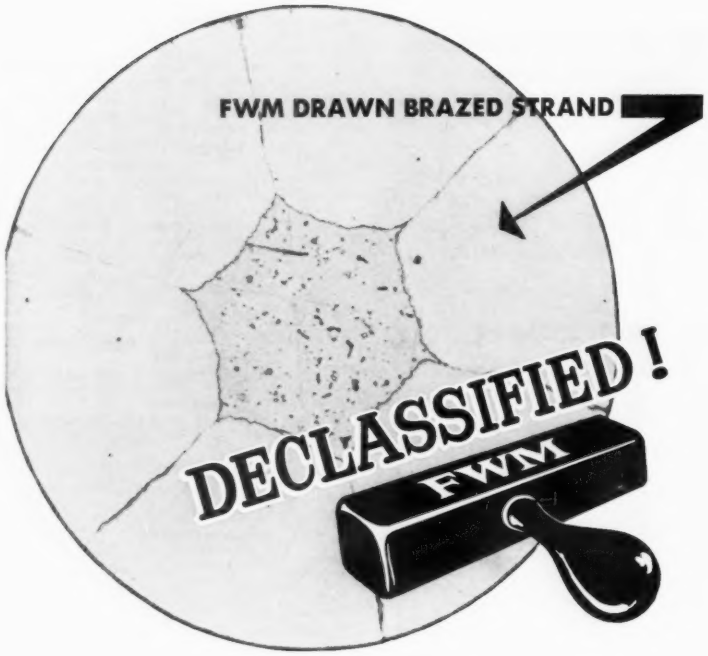
Giant Horiz. **BORING MILL**
18" dia. Spindle, 13' Vert. &
30' Horiz. Travel
100 to 4000 T **PRESSES**
Unused & little used U. S. Govt. surplus machy. Mfgd. as late as 1955. Sacrifice before removal.
WENDER PRESSES, INC.
1957F Clay, Detroit 11, TR 2-1270

Positions Wanted

ELECTRIC FURNACE STEEL MELTER, 26 years experience in melting of stainless; aircraft, forging, and commercial steels; mold and ladle preparation; and casting ingots from 1,000 pounds to 100,000 pounds. Reply Box 947, STEEL, Penton Bldg., Cleveland 13, Ohio.

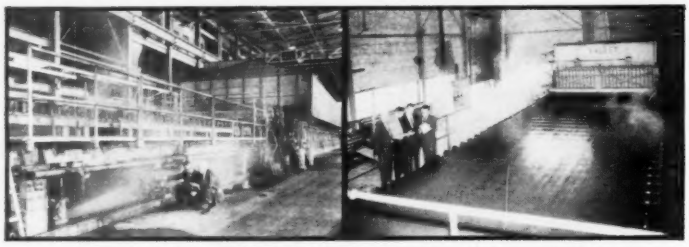
SALES ENGINEER—25 years experience calling on steel plants, foundries, and metalworking companies, on commission basis. Reply Box 948, STEEL, Penton Bldg., Cleveland 13, Ohio.

MANAGER OR SUPERINTENDENT of a forging plant. Over 20 years experience. Broad knowledge of all operations including maintenance. Reply Box 949, STEEL, Penton Bldg., Cleveland 13, Ohio.



The photomicrograph above, made from an etched .009" cross section of a new composite stainless alloy and phosphor bronze wire, was one of Fort Wayne Metals most closely guarded secrets since 1957; and well it might have been.

Used in Fourdrinier paper machine wire screen belts up to 200 feet long and as wide as a two lane highway, it is responsible for a major cost reduction in the multi-billion dollar paper industry.



Paper makers (many running their block-long Fourdriniers 24 hours a day) who once had four-hour shutdowns every week from wire failure—at a cost up to $1,000 an hour—now run as long as a month or more without wire trouble, even 102 days under special conditions. FWM's Drawn Brazed Strand ("DBS") provides the extra fatigue life and better chemical resistance required to bring about this saving.

"DBS" can be produced in a composite of many different types of alloys for diversified uses, including physical, thermal, chemical, magnetic, electronic and electrical applications. "DBS" may prove to be an important development in many products where high fatigue resistance, light weight, chemical inertness, controlled conductivity or combinations of these characteristics are required.

"DBS" development is typical of the ideas in precision alloy wire you can expect from FWM. We will be glad to forward "DBS" data on request.

PRECISION FINE WIRE
STAINLESS AND OTHER ALLOYS
FWM
FORT WAYNE METALS, INC.
3211 MacARTHUR DRIVE
FORT WAYNE, INDIANA

SEND FOR "FWM" IDEA FOLDERS

FORT WAYNE METALS, INC.
3211 MacARTHUR DRIVE
FORT WAYNE, INDIANA

100 tons, cable dock enclosures, Western Electric Co., Chicago, to Wendnagel Co. Inc., that city.

STRUCTURAL STEEL PENDING

32,250 tons, superstructure, Sunshine Toll Bridge, Mississippi River, Ascension-St. James Bridge & Ferry Authority, Donaldson, La.; American Bridge Div., U. S. Steel Corp., Pittsburgh, low.

15,000 tons, Beacon-Newburgh bridge superstructure, New York State Bridge Authority, Poughkeepsie, N. Y.; bids July 27.

12,000 tons, state expressway along Northern Boulevard, Queens, New York; bids Aug. 10.

12,000 tons, section of state Gowanus Parkway, New York; bids Aug. 10.

2500 tons, office, Spring Cotton Mills, New York, George A. Fuller Co., New York, contractor; bids closed.

1680 tons, state bridgework FAHRD 61-1, New York County, New York; bids July 27.

1580 tons, state highway project Route 80, Sec. 5N, Bergen County, New Jersey; Franklin Contracting Co. low on general contract.

1183 tons, state highway work, Route 287, Sec. 3-B, Middlesex County, New Jersey; bids Aug. 11; also 422 tons of reinforcing bars required.

853 tons, angles, Grade M, Military Industrial Supply, Navy, Philadelphia; bids July 31; shipment to various destinations.

750 tons, special assembly building, Cape Canaveral, Fla.; Paul Smith Construction Co. of that state low on general contract.

684 tons, state bridgework, FAHRD 61-1, New York County, New York; bids July 27.

600 tons, headquarters building, National Maritime Union, 13th Street and Seventh Avenue, New York; bids closed.

500 tons, warehouse and office, North Brunswick, N. J., General Motors Corp.; Fred J. Brotherton low on general contract.

400 tons, manufacturing building, Sarco Mfg. Corp., Allentown, Pa.; Walter Kidde Constructors Inc., designer and engineer.

290 tons, air traffic control center, MacArthur Field, Islip, N. Y.; Acme Missile & Facility, Long Island, low bidder.

251 tons, state bridgework, Jefferson County, Pennsylvania; bids Aug. 11; also 378 tons of reinforcing bars required. Highway program in this county will also require several prestressed concrete superstructures.

190 tons, office and warehouse, A.D.F.A. Inc., Rockleigh, N. J.; Engineers Inc., general contractor.

131 tons, state highway bridge, FARC 61-95, Jefferson County, New York; bids July 27.

100 tons, Center Avenue Bridge, Ft. Lee, N. J., for the Port of New York Authority; bids asked.

REINFORCING BARS . . .

REINFORCING BARS PENDING

422 tons, state highway work, Route 287, Sec. 3-B, Middlesex County, New Jersey; bids Aug. 11; also 1183 tons of shapes required.

378 tons, state bridgework, Jefferson County, Pennsylvania; bids Aug. 11; 251 tons of shapes will also be required.

175 tons, Washington state box girder span, Yakima County; Sound Sand & Gravel Co., Port Orchard, Wash., low $127,508.

150 tons, Seattle Pacific College dormitory and dining hall; George E. Teufel Co., Seattle, low on combined tender, $1,268,461.

135 tons, Washington state Cedar River bridge, King County; Bergerson & Roberts and Earley Construction Co., Tacoma, Wash., joint low at $114,470.

105 tons (also 40 tons shapes), Washington state box girder bridge, Whatcom County; Lockyear & White Inc., Longview, Wash., low $193,459.

100 tons or more, five state bridges, Alaska, total length, 783 ft; M-B Contracting Co., Seattle, low $875,019.

PLATES . . .

PLATES PLACED

1027 tons, carbon, Navy Purchasing Office, Washington, to Phoenix Steel Corp., Claymont, Del.

1000 tons, fabricating building, Tonawanda,

N. Y., to Buffalo Structural Steel Corp., Buffalo.

250 tons, one cone roof tank, Mobil Oil Co. Inc., Elmira, N. Y., to an unnamed fabricator.

225 tons, one cone roof tank, Melton, N. Y., to Fisher Tank Co., Chester, Pa.

100 tons or more, elevated water storage tank, veterans' hospital, Montrose, N. Y., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

100 tons or more, wrought homogeneous, Ordnance Dept., Aberdeen, Md., to U. S. Steel Corp., Pittsburgh, $247,495.

Unstated tonnage, resurfacing Hackensack River bridge, Secaucus, N. J., to Phoenix Bridge Co., Phoenixville, Pa.

100 tons or more, jet fuel tank, Williams AFB, Arizona, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

PLATES PENDING

211 tons, high tensile, Military Industrial Supply, Navy, Philadelphia; bids July 31.

108 tons, Grade M, Type I, Navy Purchasing Office, Washington; delivery to New York Naval shipyard, Brooklyn, N. Y.

PIPE . . .

CAST IRON PIPE PLACED

500 tons or more, 24,660 ft 12 in. supply mains, for Cold Beach, Oreg., to the U. S. Pipe & Foundry Co., Portland, Oreg.

450 tons, 4 to 12 in., for Seattle improvement district, to Pacific States Cast Iron Pipe Co., Seattle.

150 tons, 3700 ft, 12 in., for Tacoma improvement, to Pacific States Cast Iron Pipe Co., Seattle.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Chicago, Rock Island & Pacific, ten, 1800 hp road switchers, to Electro-Motive Div., LaGrange, Ill., General Motors Corp.

Union Pacific, 11 diesel-electric freight locomotive units; four 2400 hp units to Alco Products Inc., Schenectady, N. Y., four 2500 hp units to General Electric Co., Schenectady, and three 2400 hp units to Electro-Motive Div., LaGrange, Ill., General Motors Corp.

RAILROAD CARS PLACED

Gulf, Mobile & Ohio, 475 freight cars to Pullman Inc., Chicago, four hundred, 50 ft boxcars to be built at the Bessemer, Ala., plant, and 75 cover hopper cars at the Butler, Pa., plant. Work on the cars starts Aug. 14. They will cost $4,500,000.

Union Pacific, 35 postal storage cars and 10 baggage cars, to St. Louis Car Co., subsidiary of General Steel Industries Inc. Cars will be built at North St. Louis, Mo., with deliveries scheduled to begin in the second quarter of 1962.

American Refrigeration Transit Co., ten 50 ton, steel sheathed refrigeration cars, to Pacific Car & Foundry Co., Renton, Wash.

Northern Pacific, fifty, 50 ft, mechanical refrigerator cars, to Pacific Car & Foundry Co., Renton, Wash.

Brazilian Federal Railway System, 18 passenger cars, to the Berwick, Pa., plant of ACF Industries Inc., New York.

Wabash, 515 roller bearing equipped freight cars, 50 ton capacity, to American Car & Foundry Div., ACF Industries Inc., New York. Cost: $4,750,000.

New York City Transit Authority, 236 subway cars, to St. Louis Car Co., subsidiary of General Steel Industries Inc., St. Louis.

RAILROAD CARS PENDING

New York City Transit Authority, 1580 subway cars proposed in capital budget for 1962. The budget is subject to approval by Board of Estimates. St. Louis Car Co., subsidiary of General Steel Industries Inc., is reported low bidder on 220 subway cars figured under current budget.

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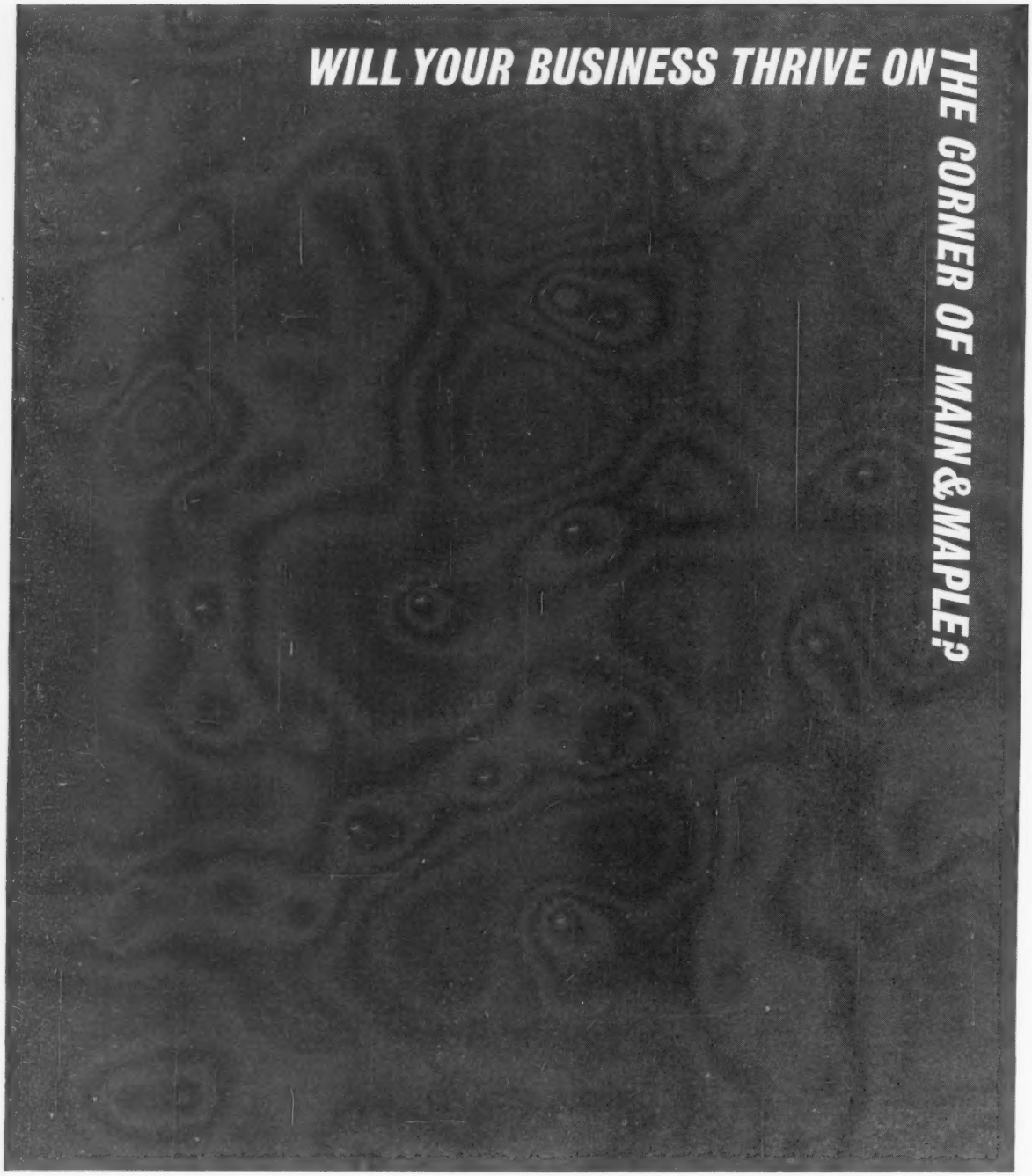
Coming Aug. 7 IN STEEL

Saline Water Conversion: Giant Industry Aborning?

"Fresh water shortages in the U. S. will be severe enough to make the conversion of salt water a major commercial venture within 15 or 20 years." So predicts the House Committee on Science and Astronautics.

Next week, STEEL examines the market opportunities, including one estimate that within 15 years, $10 billion to $20 billion will have to be spent on new conversion plants.



Our population isn't all that's growing. Needs are. Markets are. And so are towns and cities in the path of our growing economy. Here's how to bring the business your way, how to put your corner in the mainstream of a growing America.

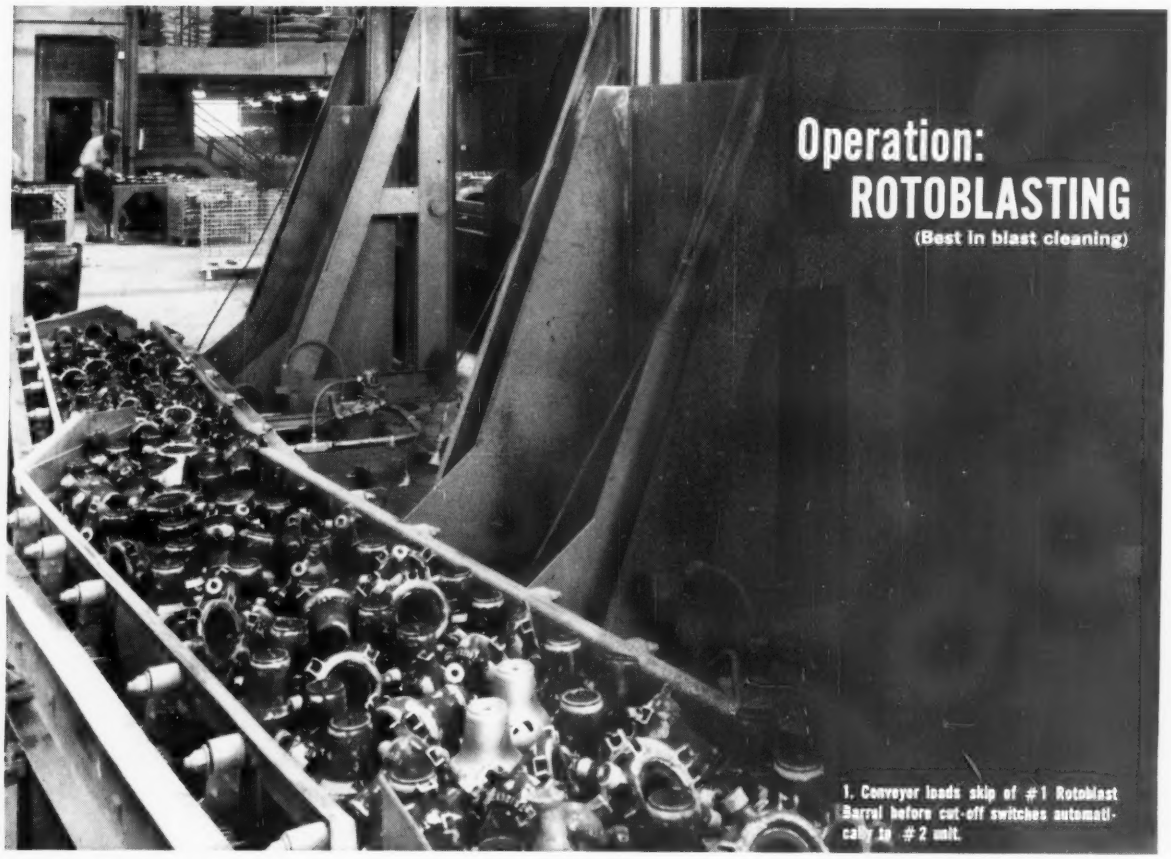
Take a look around your corner, even to the outlying areas of town. Surely you'll see room for development, for new industries that create new jobs and bring in new customers. The development of your community will make more room for your youngsters to grow, find jobs, careers and a future —not far from Main & Maple.

And there's no time like the present to begin. If your town is looking for new industry, your Department of Commerce can help. Field experts will show how to evaluate what you have to offer, and how to present it to the best prospects. (If you're a businessman with expanding ideas, they'll direct you to suitable locations.)

Take advantage of the many ways in which your business can grow. In attracting new industry to your local community. In new domestic markets. In the lucrative foreign markets. In developing new products and services. Just write or phone the U. S. Department of Commerce Office of Field Services in your city, or Washington 25, D.C. Your U.S. Department of Commerce is always ready to help you grow with America!

ADVERTISING COUNCIL PUBLIC SERVICE

NOW'S THE TIME TO GET GROWING IN A GROWING AMERICA!



Operation: ROTOBLASTING

(Best in blast cleaning)

1. Conveyor loads skip of #1 Rotoblast Barrel before cut-off switches automatically zip #2 unit.

Complete automation in blast cleaning!

Pangborn Rotoblast removes heavy sand cores and cleans up to 45,000 castings per shift at Neptune Meter!

A new and *completely automatic* Rotoblast operation not only cleans castings in half the time, but a new special separation removes heavy sand cores as well at Neptune Meter Co., Long Island City. The world's largest exclusive manufacturer of meters for liquids, Neptune can now handle 45,000 castings from the molds each shift . . . with just two automated Rotoblast Barrels.

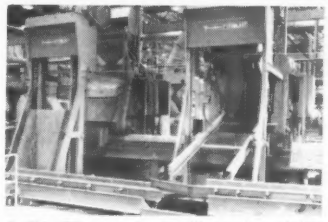
No costly or time-consuming manual lifting, toting or weighing here! Once the button is pressed, the Rotoblast sequence starts and recycles automatically until stopped at the end of the shift!

Whether your installation features automation or batch cleaning, Rotoblast cleaning efficiency can cut *your* operating and manpower costs. Flexibility of installation, ease of maintenance, durable construction—all contribute to lower overall cleaning costs.

Write PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md., Pangborn Canada, Ltd., 47 Shaft Road, Toronto (Rexdale), Canada; or phone district office in Yellow Pages, "Sand Blast Equipment." *Manufacturers of Blast Cleaning, Vibratory Finishing, Dust and Fume Control Equipment—Rotoblast® Steel Shot and Grit®.*

Pangborn

OF HAGERSTOWN

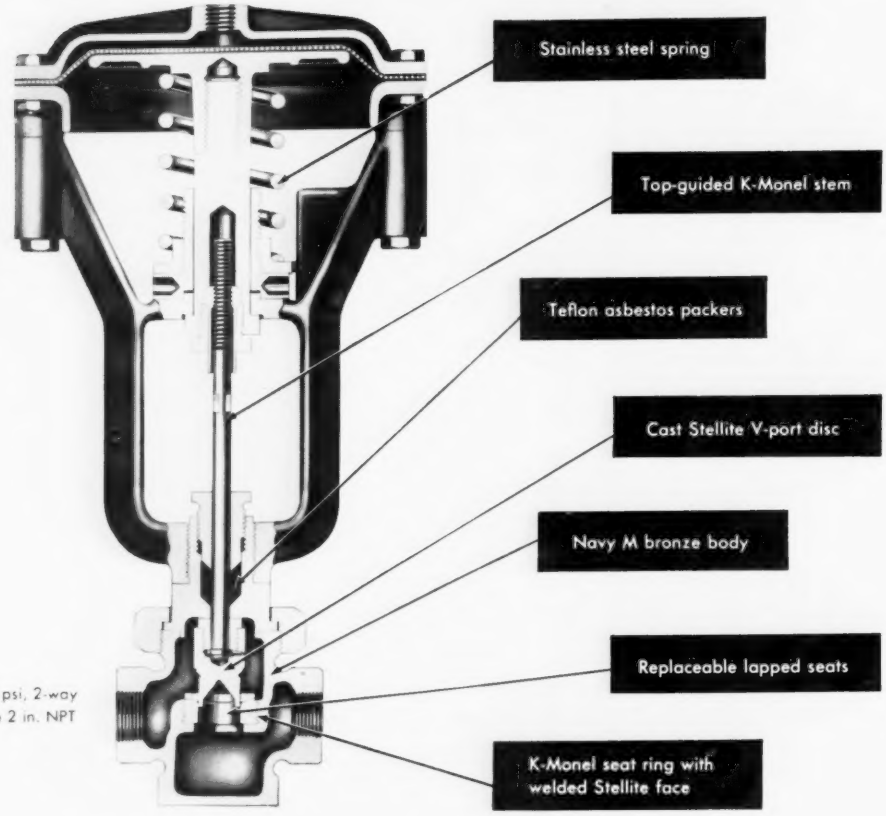


2. Skip fills second unit with exact pre-determined load for cleaning.

3. Cleaned castings move on take-away conveyor to next operation.

4. Before and after Rotoblasting. Note core sand and rods in uncleaned piece.

SINCLAIR-COLLINS® V-PORT VALVES



. . . for precise control of pressure or temperature . . . steam, hot or cold raw water service

Sinclair-Collins' V-port valves offer a solution to your temperature or pressure modulation problems. Designed for instrument actuation, they offer variable metering to provide extremely accurate and consistent control of media flow rates. Highest quality materials and Sinclair-Collins' precision manufacturing methods assure long, reliable service life, with minimum maintenance downtime. Stainless steel trim resists corrosion . . . Stellited seat ring and port disc resists wire drawing and cutting. Find out how S-C V-port valves can meet your control needs . . . a call to your near-by Sinclair-Collins Field engineer will bring prompt application engineering recommendations.

For more information write for free Bulletin SC-59. Address: Sinclair-Collins Valve Company, Akron 9, Ohio, Dept. ST-761.

The SINCLAIR-COLLINS VALVE Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)
AKRON 11, OHIO

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